



FRIDAY, FEBRUARY 15, 1895

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## Contributions.

## Cables for New York Elevated Roads.

179 Washington St.,  
BROOKLYN, N. Y., Feb. 7, 1895.)

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your brief editorial, wisely commending the report of the board of experts on New York Rapid Transit (page 70, issue of Feb. 1), you write, the report "has the immense merit of suggesting something practical—that is, practical, if there is any power of law or self interest which can bring about a working agreement with the Manhattan Company."

This is true; unbiased and informed experts have, during the weary and indecisive discussion of this important subject, recognized that the only hope of immediate amelioration of the present congested conditions of service, as well as of its permanent and expansive relief, was from a well considered extension of the present elevated railroad system and an adequate increase in its transportation capacity. All other schemes have failed in the past, and doubtless will in the nearby future.

Discussion of the expansion of this system by the construction of new lines, either branch or main, will not be entered upon here; confident that more acute and competent observers of the city's present and coming needs will suggest and mature all the requisite plans for this, when the proposed relief by them is approved.

Increase in the capacity of the present elevated railroads to transport passengers, is not only possible, but in some degree simple. With trains hauled by locomotives, the limit of service is fixed; first by the traction power of the motor and consequently its weight, which must not exceed that which the structure may safely sustain; and second, by the least space between the trains of the largest number of cars such motors may haul which may with prudence be allowed; the two together permitting a certain maximum number of cars to pass a given station per hour; which number cannot be increased without adding to the weight of the locomotives, a corresponding strengthening of the railroad, and a reduction of the lineal or time space between trains; each of which under existing conditions is practically beyond actual consideration.

Should, however, the locomotives be dispensed with, instead of their superior unit load upon the structure, would be imposed the lesser load from each moving car; and this would not be greatly increased or exceed the ability of the structure to safely bear, if these cars were run in one connected series, platform against platform; instead of as now, with a space several train lengths interposed. And when so run, the maximum transportation capacity of the several lines would be reached; and this, independently of the speed at which the trains are run.

Speed, however, in a consideration of this matter, is a portentous factor. The passenger who rides between far down town and far up town (a small unit compared with the large number of those whose transit between intermediate and perhaps closely located points contribute most of the railroad's revenue) would if he could have his own way, prevent the train he takes from making more than two, the terminal stops. In other words, for him and his, the latter including those who expect to profit by the improvement and sale of outlying real estate; and perhaps a very few others, whose allotted modicum of time is too small to permit any wastage in their bodily transit; express trains are clamorously demanded which, if run, are to be operated, as every experienced railroad man knows, at a dead loss. This loss must be met and overcome, if the entire working of the lines is profitable, by the surplus revenue from the short riders, who are obliged to pay, in a measure more or less, the cost of carrying the long riders.

The unreasonable demands of the long riders being conceded, the problem is how to run on the existing structures and without radical change, through and way trains, safely, smoothly, and without either interfering and with little regard to the lineal or time spaces between them.

In brief, the solution is, to substitute cable for locomotive traction; to lay two sandwiched tracks instead of each one now in place, and each track to have its separate hauling cable. Whence one track and cable would be for the through trains and the other track and cable would be for way trains. The stations should be so placed and the tracks so arranged that the through trains would stop only at the stations quite far apart; and the way trains would stop at these and the intermediate stations; when either of the latter were at rest at a way station, the following through train would pass it; the whole being so arranged and operated, that a passenger from a way station could ride, if he pleased, on a way train to a through station, there exchange to a through train and ride to the through station nearest to his destination, and then, if desirable, take a way train to that point. The system, as thus briefly outlined, is manageable, elastic and capable of a large increase in carrying capacity, without a relative increase in the cost of working.

A candid critic, disposed to entertain the proposition thus laid down, may pertinently inquire, why such has not been before presented—particularly when he recalls the multitudinous opportunities during quite too long a period for such, before the several boards charged with the consideration and determination of rapid transit in New York. In reply, it may be said, that for late years, few have had immediate or remote interest in promoting cable traction; that the selection of it to-day as an agent for moving cars, in preference to other agents, is simply a matter of engineering knowledge and choice; and that such choice, when so made, results in increased profits almost solely to those who are shareholders in the undertaking and who generally are not disposed publicly to announce how much these profits are.

G. LEVERICH.

## The Systematic Improvement of the Lake Shore &amp; Michigan Southern Railway.

BY BENJAMIN REECE, M. AM. SOC. C. E.

(Continued from page 80.)

[The portion of this article published in an earlier issue was introductory and general. It brought us up to the point where specific means of increasing the train-load were introduced.—EDITOR.]

For purposes of comparison Division records were kept, and from the annual reports we learn that by his close watchfulness and the improved discipline of the service, Mr. Chas. Paine, as General Superintendent, succeeded in increasing the average trainload from 159 tons of paying freight per train in 1874 to 237 tons in 1879, an average increase over the entire line of nearly 50 per cent. per train. From the Division records, the economical advantages of the low grades and light curves of the Air Line, Sandusky and Erie Divisions showed in the lower cost of train service, and the economy of good location was on the Lake Shore soon treated as a condition and not a theory.

observed that the advantages heretofore noted as existing in favor of the Air Line, Sandusky and Erie Divisions do not appear in any marked degree upon the record, because the distribution of the motive power was made with the view of equalizing such records, awarding the heavier locomotives to the divisions which were at a physical disadvantage.

Prior to 1876 the Air Line had been largely devoted to the movement of eastbound freight between Elkhart and Toledo, while the "Old Road," with its sharper curves and heavier grades, had been given over to the lighter westbound movement. Between Cleveland and Toledo, the Sandusky and Norwalk parallel lines had been similarly used as securing, in part, the advantages in despatching trains afforded by second track. After 1876 the eastbound and westbound freights were massed on the single tracks of the Air Line and Sandusky Divisions, while the "Old Road" and Norwalk lines, with their heavier grades and sharper curves, were measurably confined to the local traffic and the freight received from connecting lines and branches.

The wise policy of maintaining good track and keeping the rolling stock and motive power in proper repair under every vicissitude of fortune, not only forced the departments into well-considered and systematic economies, but it found the property in excellent condition for the greatly increased business which came with the revival of 1880. The showing made that year was editorially commented upon by the *Railroad Gazette* in terms of praise. The demand for rolling stock was urgent, and orders were issued to load the cars rated with 24,000 lbs. to 27,000 lbs. for paying freight, and up to 30,000 lbs. where material for company's use was moved. From that time on dates the construction of cars of increased capacity, the results of which can be seen by a glance at the figures shown in Table D.

TABLE D.—CAPACITY OF CARS.

| Capacity of Cars.                              | Number in 1879. | Number in 1894. |
|--|-----------------|-----------------|
| 20,000 lbs.                                    | 100             | 4               |
| 22,000 "                                       | 100             | 14              |
| 24,000 "                                       | 7,737           | 2,368           |
| 26,000 "                                       | 2,683           | 28              |
| 28,000 "                                       | 4               | 3,587           |
| 30,000 "                                       | 4               | 4               |
| 32,000 "                                       | 4               | 12              |
| 36,000 "                                       | 4               | 12              |
| Total cars less than 40,000 lbs. capacity..... | 10,520          | 6,017           |
| 40,000 lbs.                                    | 3,596           | 3,596           |
| 45,000 "                                       | 3,397           | 3,397           |
| 50,000 "                                       | 3,332           | 3,332           |
| 60,000 "                                       | 4,390           | 4,390           |
| 80,000 "                                       | 49              | 49              |
| Total cars 40,000 lbs. and over.....           | 14,764          | 14,764          |

CHANGES OF GRADE AND LINE.

Of the 11½ per cent. net earnings in 1880 8 per cent. was paid out in dividends, while the remaining 3½ per cent. was used to inaugurate that second series of Lake Shore improvements commenced in 1881, and which, with more or less vigor, has been continued to the present time. Eighteen hundred and eighty-one was a year of great activity in the engineering department of

TABLE C.—CHANGES OF GRADE.

| Date. | Number. | LOCATION.  | Length of Change. | Old Grade per Mile. | New Grade per Mile. | Cut.  | Fill. |
|-------|---------|--|-------------------|---------------------|---------------------|-------|-------|
|       |         |  | Miles.            |                     |                     |       |       |
| 1881  | 1       | Western Division (Changes on this Division 2' and 3'), Cut or Fill—aggregate, 8 miles. | 4.7               | 29.8                | 14.80 and less.     | 2.0'  | 8.0'  |
| 1887  | 1       | Dune Park to Porter.....   | 5.3               | 24.34 and less.     | 15.84 and less.     | 6.0'  | 8.0'  |
| 1881  | 2       | Burdick.....   | 2.0               | 24.9 and less.      | 3.71                | 5.0'  | 7.0'  |
| 1881  | 3       | Durham.....  | 15.0              | 34.3 and less.      | 15.84 and less.     | 12.0' | 20.0' |
| 1882  | 4       | La Porte, change of grade and line.....  | 6.0               | 25.70 and less.     | 15.84 and less.     | 2.0'  | 6.0'  |
| 1892  | 5       | Terre Coupe.....   | 2.6               | 15.00               | 7.4                 | 2.0'  | 4.0'  |
| 1886  | 6       | Leeght to So. Bend.....  | 10.0              | 21.0 and less.      | 15.84 and less.     | 13.0' | 10.0' |
| 1892  | 7       | Air Line (changes on this Division 2' and 3'), Cut or Fill—aggregate length, 24 miles. | 5.0               | 18.0 and less.      | 15.84 and less.     | 3.0'  | 5.0'  |
| 1887  | 8       | Ligonier (West).....   | 8.5               | 22.5 and less.      | 15.84 and less.     | 4.0'  | 9.0'  |
| 1888  | 9       | Ligonier to Wawaka.....  | 6.6               | 21.5 and less.      | 15.84 and less.     | 4.0'  | 8.0'  |
| 1888  | 10      | Brimfield to Kendallville.....   | 10.0              | 21.5 and less.      | 15.84 and less.     | 8.0'  | 8.0'  |
| 1888  | 11      | Hardy to Sedan.....  | 1.0               | 45.9 and less.      | 15.84               | 7.0'  | 5.0'  |
| 1889  | 12      | Amsden to Maitland.....  | 1.5               | 26.4                | 15.84               | 5.0'  | 5.0'  |
| 1889  | 13      | Sandusky Division.   | 2.0               | 16.0 and less.      | Jewel.              | ..... | 5.0'  |
| 1891  | 14      | E. Toledo.....   | 16.3              | 38.3 and less.      | 15.84 and less.     | 12.0' | 14.0' |
| 1891  | 15      | Sandusky.....  | 30.0              | 29.8 and less.      | 15.84               | 6.0'  | 7.0'  |
| 1891  | 16      | Huron.....   |                   |                     |                     |       |       |
| 1891  | 17      | Vermillion to Elyria.....  |                   |                     |                     |       |       |
| 1891  | 18      | Showville.....   |                   |                     |                     |       |       |
| 1891  | 19      | Erie Division—Little work done.  |                   |                     |                     |       |       |
| 1891  | 20      | Buffalo Division (35 miles on Buffalo Division), changes proposed not yet done.        |                   |                     |                     |       |       |
| 1891  | 21      | State Line.....  | 2.8               | 25.3 and less.      | 15.84 and less.     | 2.0'  | 8.0'  |
| 1892  | 22      | Ripley Crossing.....   | 4.5               | 30.6 and less.      | 15.84 and less.     | 5.5'  | 9.0'  |
| 1892  | 23      | Van Buren to Dunkirk.....  | 4.3               | 25.3 and less.      | 15.84 and less.     | 1.0'  | 5.0'  |
| 1892  | 24      | Change of line.  |                   |                     |                     |       |       |
| 1892  | 25      | Dunkirk to Silver Creek.....   | 9.0               | 39.9 and less.      | 15.84 and less.     | 74.0' | 2.0'  |
| 1892  | 26      | Silver Creek to Angola.....  | 9.0               | 32.3 and less.      | 15.84 and less.     | 10.0' | 16.0' |

Table A shows the number of cars hauled per locomotive on the several main line Divisions during the year

TABLE A.—MOVEMENT OF FREIGHT TRAINS AND FREIGHT CARS ON ALL DIVISIONS FOR THE YEAR 1879.

| DIVISIONS.    | Trains. | Loaded Cars. | Empty Cars. | Total Cars. | Loaded Cars per Train. | Empty Cars per Train. | Total Cars per Train. | Light Engines. |
|---------------|---------|--------------|-------------|-------------|------------------------|-----------------------|-----------------------|----------------|
| Buffalo.....  | 16,105  | 412,068      | 170,878     | 582,947     | 25.6                   | 10.6                  | 36.2                  | 321            |
| Erie.....     | 16,025  | 472,251      | 183,336     | 655,587     | 29.5                   | 11.4                  | 40.9                  | 280            |
| Toledo.....   | 12,374  | 339,117      | 109,201     | 448,318     | 27.4                   | 8.8                   | 36.2                  | 206            |
| Air Line..... | 6,794   | 200,789      | 57,042      | 257,831     | 29.5                   | 8.4                   | 37.9                  | 33             |
| Western.....  | 7,629   | 205,977      | 59,246      | 265,223     | 27.7                   | 7.8                   | 34.8                  | 100            |
| Total.....    | 58,927  | 1,630,202    | 579,703     | 2,209,906   | .....                  | .....                 | .....                 | 940            |
| Average.....  | 11,785  | 326,040      | 115,941     | 441,981     | 27.7                   | 9.8                   | 37.5                  | 188            |

1879. As no like record had been preserved during the early seventies, no comparison can be made. It will be

the Lake Shore; large yards and transfer buildings were constructed at Englewood, new lands were acquired at Detroit, and the docks, buildings and tracks were rearranged and entirely reconstructed throughout, considerable trackage was added to the freight yards of the line, and the facilities for handling ore at Ashtabula were extended and improved. Seventeen miles of second track were built between Cleveland and Toledo and 12 miles on the Western Division between La Porte and Burdicks. During the same year the work of changing grades and alignment, as shown on Table C, was commenced, and the work on the Western Division was in great part completed during the year.

The excavations for the changes of grade were performed in great part by steam shovels, loading the material on cars, which were hauled out to the lifting gangs employed in raising the low portions of the grade. The changes of grade extending from La Porte west to Otis were done by laborers in connection with the building of

second track, while the changes of line immediately west of New Carlisle were done by contract.

Table C gives the location, length and date of changes made on the several subdivisions of the main line, extending from Chicago to Angola, but 35 miles on the easterly end of the Buffalo Division remaining to complete the entire work. The cuts and fills designated in Table C represent the actual number of feet the track was lowered at the higher and raised at the lower points of each change made. Exception must be noted for the 20-ft. cut and 12-ft. fill shown for the La Porte change of line, Fig. 3 and the 74-ft. cut for the change of line between Silver Creek and Dunkirk, Fig. 5, in both of which

The plan designated as Fig. 3 shows the change of line extending from the Lake Erie & Western Railway crossing east of La Porte, to a point east of Rolling Prairie, as shown; this change covered a distance of six miles in all, and eliminated 147° 37' of curvature.

The changes of grades resulting from this change of alignment can be found on profile marked Fig. 2, which embraces the line from Burdicks to South Bend, it being the heaviest work performed west of Toledo. The changes of grades shown in this profile, together with some minor changes in the alignment, were commenced in 1881 and finished in 1882. The grade against westbound trains shown on the profile as extending westerly from Terre Coupée was

filling in the bayou had been completed, additional land had been secured, and in 1886 the present passenger buildings were erected at Toledo, the face of the main building intersecting the westerly switch of the old "Y" tracks, which were then removed. The old C. & T. and Michigan Southern lines, which near this point formed an intersecting angle of nearly 100 degrees, had been connected by a 4° 5' curve at an elevation above the flood lines of 1881 and 1882, the round-house and connecting buildings, together with the adjoining side tracks, being raised some six feet in all.

After the completion of the new passenger station the old Island House shed was transformed into a freight

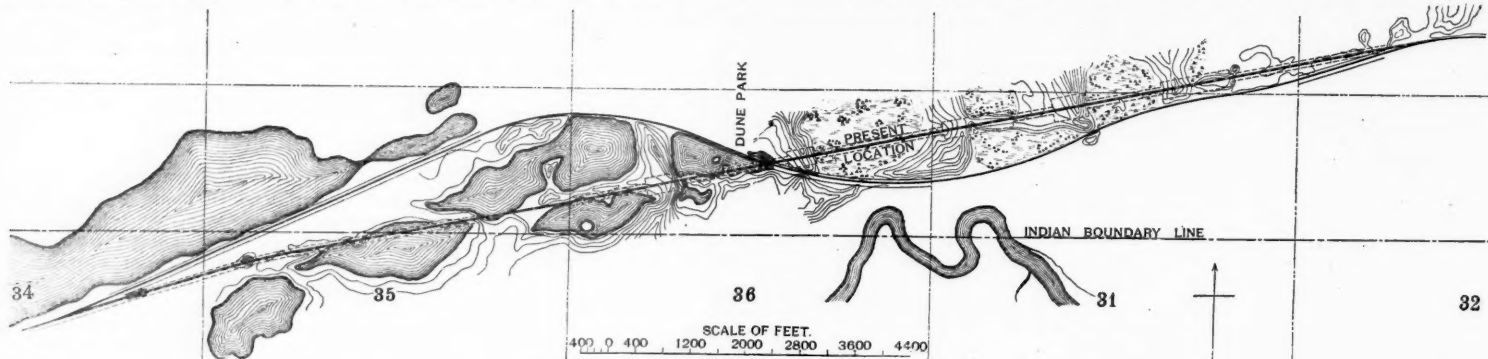


Fig. 1.—Lake Shore Changes of Line.

the extreme differences in elevation were due to the change of locations to lower ground. Table C gives a comprehensive idea of the extent and general scope of the work, while the accompanying maps and profiles fairly illustrate the character of the work in detail, and indicate its thoroughness.

The changes of grade west of Toledo were all made prior to the construction of the second track, requiring plans of work which would minimize the interference with the heavy traffic of the line on a single track.

The estimates for cutting down the grades of the Western Division were prepared under instructions received from Mr. L. H. Clarke, Chief Engineer, who had succeeded Mr. Chas. Collins in 1877. The first estimates

reduced to 18 feet per mile in 1881, and still further reduced to 15.84 feet per mile, as now shown on Fig. 2, in the year 1887. The change of line shown on plan Fig. 3 was completed in 1891 or '92.

Of the changes of grade on the Air Line, that which appears in Table C as No. 7 was completed in 1888, but was again lowered at the summit to permit of an overhead crossing for the construction of the Wabash Railway extension between Chicago and Detroit, which change was made in 1891. To provide the earth with which to raise the embankment for the easterly portion of this same change of grade, a new channel was dredged north of the right of way some 80 feet wide and 4,000 feet in length, extending from bend to bend of the Elkhart

warehouse, and the system of tracks was re-arranged to conform with the changed conditions.

May 1, 1887, Mr. L. H. Clarke, after ten years' active service as Chief Engineer, retired as Consulting Engineer, and was succeeded by Mr. G. R. Hardy, under whose direction the improvements were continued. Upon July 1, 1887, the writer severed his connection with the line, and is not personally familiar with the details of the work east of Toledo, completed since that time, but a general knowledge of the work, together with the profile placed at his disposal by the editor, enabled the list and description of the same to be included in Table C, and appear under the general sub-heads of Toledo and Buffalo Divisions. Fig. 5 shows



Fig. 3.—Lake Shore Changes of Line.

were based on a grade of 15.84 ft. per mile against east-bound freight traffic, which, in 1879, constituted 69 per cent. of the total movement, a grade of 20 ft. per mile being determined upon, against the 31 per cent. of tonnage moving westward. The original grade west of New Carlisle commenced its westerly ascent at the rate of 18 ft. to the mile, which, being noticed by Mr. Newell in an examination of the working profiles of that change, he directed the 18-ft. grade to be continued through, and ordered that the profiles for all other changes of westbound grades be similarly corrected.

But the proportion of westbound tonnage, which had never before exceeded 31 per cent., was increased to 39 per cent. in 1880, to 43 per cent. in 1881, and to 46 per cent. in 1882, which led to the further reduction of westbound grades to 15.84 ft. per mile, the same as the ruling grade ascending towards the east.

The change which on Table C appears as No. 1 was in part a change of line, which is shown on the plan marked Fig. 1. The line was originally constructed on a location involving a succession of curves, which carried it along the edge of the sand hills and swampy lakes skirting the southerly shore of Lake Michigan. The locating engineer evidently intended to keep away from the drifting sands of the one, and to avoid the soft ground of the other, as well as escape the heavy work which cutting through a series of four hills, some 60 ft. in height, involved. Careful soundings proved the bottom of the lakes to consist of a mixture of muck and sand, which, though yielding more or less readily to a considerable depth under the pressure of the sounding rod, gave evidences of ample stability for the support of the embankments required. After the embankments were completed the waste sand from the hills was excavated by parties who paid freight for its haul to Chicago, where it was sold for various commercial uses, thus initiating a source of revenue, which still continues, from the shipment of sand loaded from the adjoining hills. This work, which was commenced in 1885, was not completed until 1887, during which time the waste material, aggregating some 400,000 yards, was disposed of as described. This change took out a succession of curves, aggregating about 130 degrees of curvature.

The work between Burdicks and La Porte was completed in connection with the second track in 1881. By reference to profile marked Fig. 2, the grade extending from east of Burdicks, a distance of some five miles, to the summit at Durham, was but slightly changed, the break in the ruling grade at this point being compensated by the use of pushing engines, accommodations for these being provided at the foot of the grade.

River, turning the water through the new channel, and removing the two 150-ft. iron spans through which it had previously flowed. The stone and iron of the two structures were used at other points.

The profile marked Fig. 4 shows the character of the work, which on Table C is designated under "2 or 3 feet cut or fill aggregate length," and is illustrated to show the thoroughness with which the work has been accomplished. Of this class of work there were 32 miles in all, mostly confined to the Western and Air Line Divisions. The more important changes designated cover an aggregate distance of 129.1 miles, which with the 32 miles added, make a total of 161.1 miles of road which had to be disturbed in making the changes enumerated in Table C. Of course, these changes involved the lengthening of many arch culverts and reconstruction of bridge abut-

profile of the change of line between Dunkirk and Silver Creek, it being the heaviest work east of Toledo.

As the grades and alignment of the road were improved the construction of second tracks was rapidly pushed, and has so far progressed that with the exception of 14.18 miles of single track between Wauseon and Stryker, and 16.53 miles between Ligonier and Kendallville, making 30.71 miles of single track in all, the main line is a double-track road from Buffalo to Chicago. The Hillsdale cut-off, about six miles long, was built in 1883, and the Sharon Branch, 8.31 miles in length, was constructed in 1886.

There were laid ten miles of third track, extending east and west from Ashtabula, at which point extension one docks were erected in connection with the Franklin Branch.

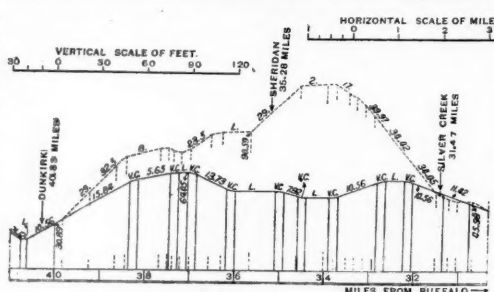


Fig. 5.

Lake Shore Profiles.

Fig. 4 shows the minute changes made over a very great part of the line and is used here merely as a specimen. Here the steepest old grade was 21 feet; the steepest new is 15.84,—grades connected by vertical curves. The change in Fig. 5 was made by re-location.

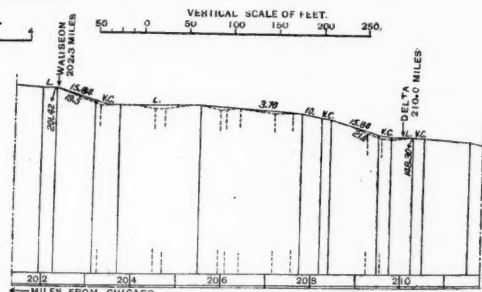


Fig. 4.

ments, while the wooden culverts then remaining were changed during the progress of the work to iron pipe or stone.

Up to the year 1886 no particular improvements had been made in the Toledo yard except the erection of the present bridge structure across the Maumee, which was completed in 1878. The lines east and west of Toledo continued to terminate in the old Island House passenger shed, the same as before the consolidation, a double-track "Y" connection enabling the passenger trains to turn, for backing into the station, while they afforded a through connection for freights. Plans to correct this feature were in preparation, and considerable filling had been done, when, as before explained, the panic of 1873 caused the stoppage of all work, and the old arrangements were continued to the spring of 1886.

During 1884-5 the work of excavating the low bluff and

In 1880 the operating expenses constituted 55.56 per cent. of the gross earnings; since 1883 no charges have been made to construction or equipment account, the entire cost of betterments, since that date, being charged to operating expenses or income account. These betterments include the erection of new buildings and improved station facilities, new iron and stone bridges, the changes in grade and alignment as described, the construction of second, third and side tracks, the expenditure of \$700,000 on the improvements at Ashtabula Harbor, together with the purchase of 149 locomotives, 177 passenger train cars, and 11,405 freight cars, at an aggregate cost for such equipment of \$9,582,671.

Not until the completion of these physical betterments, which have for years drawn heavily upon the revenues of the line, will the management secure the full benefit of the improvements in the decreased cost of operating, and



the record of 1894, as it will be made known in the annual report for that year, will in all probability present figures

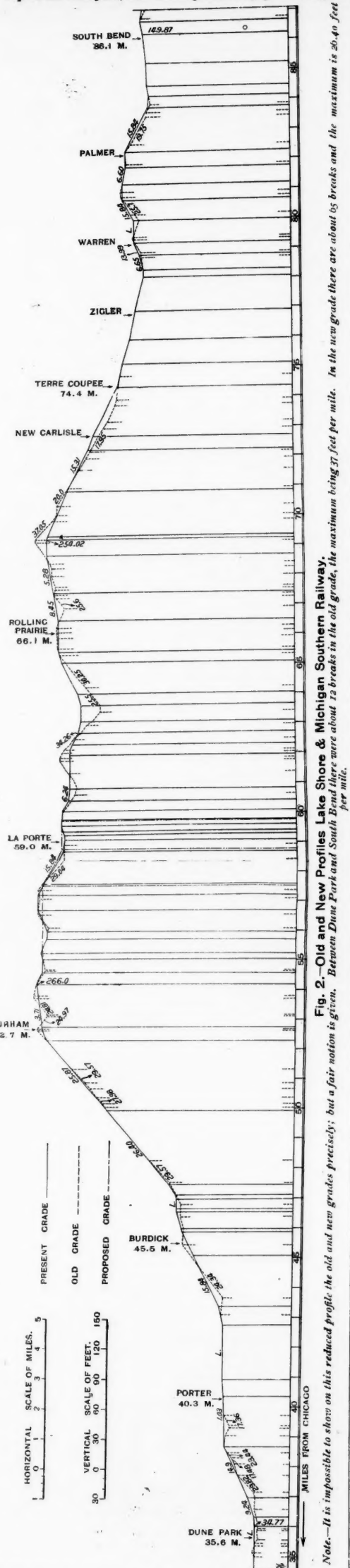


Fig. 2.—Old and New Profiles Lake Shore & Michigan Southern Railway. Note.—It is impossible to show on this reduced profile the old and new grades precisely, but a fair notion is given. Between Dune Park and South Bend there were about 12 breaks in the old grade, the maximum being 37 feet per mile. In the new grade there are about 65 breaks and the maximum is 30.40 feet per mile.

The changes of grade upon the Buffalo Division being still incomplete, a division freight yard was constructed at Westfield, 58 miles west of Buffalo, the engines being changed at that point instead of Erie, the former division yard. By this means the use of the heavier engines is confined to the steeper grades of the easterly end of the Buffalo Division.

Tables A and B record the average number of cars per freight train hauled in 1894 compared with 1879, and the difference is very slight. The Buffalo Division shows an increased wheelage of about 10 per cent., which is accounted for by the heavier power used on that Division, as will hereafter appear.

An examination of Table D will show that, while the wheelage has practically remained the same, the capacity of cars has been much increased. The table indicates that of the rolling stock owned in 1879, 74 per cent. consisted of cars having a capacity of 12 tons and less, the remaining 26 per cent. being classed as 30,000-lb. cars. Of the 20,781 cars owned in 1894, only 29 per cent. fall short of 20 tons capacity, while 34.7 per cent. are rated at 50,000 lbs. and over, a capacity about double that of the equipment used in 1879. But the designated loaded car is in

TABLE B.—LAKE SHORE & MICHIGAN SOUTHERN FREIGHT TRAINS AND CARS, ALL DIVISIONS, YEAR 1894

| DIVISIONS. | Freight Trains. | Loaded Cars. | Empty Cars. | Total Cars. | Loaded Cars per Train. | Empty Cars per Train. | Total Cars per Train. | Total Light Engines. |
|------------|-----------------|--------------|-------------|-------------|------------------------|-----------------------|-----------------------|----------------------|
| Buffalo    | 14,609          | 403,243      | 181,260     | 584,503     | 27.60                  | 12.41                 | 40.01                 | 164                  |
| Erie       | 18,254          | 499,487      | 205,283     | 704,770     | 27.36                  | 11.25                 | 38.61                 | 241                  |
| Toledo     | 12,122          | 310,739      | 141,609     | 452,348     | 25.63                  | 11.68                 | 37.31                 | 93                   |
| Air Line   | 7,853           | 196,942      | 78,793      | 275,735     | 25.13                  | 10.05                 | 35.18                 | 205                  |
| Western    | 7,776           | 176,551      | 91,314      | 267,865     | 22.70                  | 11.74                 | 34.44                 | 124                  |
| Total      | 60,599          | 1,586,962    | 698,259     | 2,285,221   |                        |                       |                       | 827                  |
| Average    | 12,120          | 317,392      | 139,652     | 457,044     | 26.19                  | 11.52                 | 37.71                 | 165                  |

practice a vague and uncertain quantity and may imply an ore car loaded up to 40 tons, or a sealed car containing one or two little boxes. It is evident that the correction of this feature is largely a matter of discipline, and the exercise of care in loading warehouse freight, which, with proper attention, will secure an equal tonnage with less wheelage, and in busy times it is of prime importance to avoid the handling of such cars in congested yards and crowded warehouses, both at the receiving station and place of destination, to say nothing of the release of such cars for other uses.

The annual report for the year ending December 31, 1893, shows the average train loads for the year to have consisted of 275.7 tons of revenue load, to which should be added an average of 13.6 tons per train earning no revenue, being moved for company's use, making a total average of 289.3 tons per train. These figures are derived from an accounting of all trains including those on the "Old Road" through Michigan, the Norwalk Division and branch lines of the system, where few or no changes in the physical features of road have been attempted. The shorter fast time freights as well as way trains of the entire system are included, all of which would tend to reduce the general average load of those trains, which from the nature of the traffic can be loaded to the full capacity of the engines hauling them. It must be borne in mind that the growing volume of westbound traffic does not necessarily imply a return load for the eastbound trains. The distribution of these movements as to time would largely govern, while in many cases the difference in the nature of the traffic would preclude the use of the returning empty cars.

The records in Tables A and B include the movement of

TABLE E.—SPEED OF PASSENGER TRAINS.

| Chicago & Buffalo—East Bound. |  |                             |  |
|-------------------------------|--|-----------------------------|--|
| 1879.                         |  | 1894.                       |  |
| No. 4—28.5 miles per hour.    |  | No. 2—26 miles per hour.    |  |
| " 6—25.2 "                    |  | " 6—36.3 "                  |  |
| " 8—25.5 "                    |  | " 10—32.6 "                 |  |
|                               |  | " 22—39.4 "                 |  |
|                               |  | " 28—29.4 "                 |  |
|                               |  | " 36—29.4 "                 |  |
| Chicago & Buffalo—West Bound. |  |                             |  |
| 1879.                         |  | 1894.                       |  |
| No. 1—27 miles per hour.      |  | No. 23—34.5 miles per hour. |  |
| " 3—23.2 "                    |  | " 35—34.7 "                 |  |
| " 5—27. "                     |  | " 37—27.4 "                 |  |
|                               |  | " 3—37.7 "                  |  |
|                               |  | " 15—35.8 "                 |  |

TABLE F.—SPEED OF FREIGHT TRAINS.

| Chicago to Buffalo.               |  |                                   |  |
|-----------------------------------|--|-----------------------------------|--|
| 1879.                             |  | 1894.                             |  |
| No. 38—52 hrs. min. miles per hr. |  | No. 60—33 hrs. min. miles per hr. |  |
| " 40—46 " 11.4                    |  | " 62—32 " 15.7                    |  |
| " 22—39 " 13.1                    |  | " 6—32 " 16                       |  |
| " 26—38 " 13.6                    |  |                                   |  |
| Buffalo to Chicago.               |  |                                   |  |
| 1879.                             |  | 1894.                             |  |
| No. 41—38 hrs. min. miles per hr. |  | No. 61—33 hrs. min. miles per hr. |  |
| " 23—51 " 9.9                     |  | " 63—42.5 " 12.3                  |  |
| " 39—48 " 10.9                    |  | " 65—33 " 15.6                    |  |

light engines and empty cars, both of which tend to lower the average tons handled per train.

Tables E and F show the increased speed of passenger and freight trains in 1894 as compared with 1879. During the 15 years interval the train numbers have been so changed and so many trains have been added that a detailed comparison is hardly practicable.

We see from Table E that the greatest increase of speed noted in the passenger service, is that of train No. 22, which is 40 per cent. faster than was No. 4 in 1879, while No. 6, in 1894, comes next with a speed of 36.3 miles an hour. An examination of the westbound passenger trains show substantially like differences of speed which can be noted at a glance.

From Table F we gather the difference in the speed of freight trains between the two years mentioned. In the

movement of the higher grade freight which affords the best returns, the element of time is becoming more and more an important factor in competition; particularly is this the case with perishable freight and merchandise. This was largely true of stock trains in 1879, so the saving of time by the faster eastbound trains of the respective years, is not so marked, the saving of time shown by train 62 in 1894 being 6 hours and 5 minutes as compared with train No. 26 in 1879. But the tendency to the quicker movement of merchandise is better illustrated in the greatly decreased time scheduled for westbound freights, the increased speed of the trains of like class, showing a saving of from 15 to 16 hours between Buffalo and Chicago. Without doubt this quicker movement of trains has been facilitated by the extension of the second track, while upon the other hand, the greater number and increased speed of passenger trains has tended to retard their movements.

For the purpose of this examination the year 1879 has been selected because in that, and the years immediately preceding it, every effort had been made to increase the average train load, while at that time none of the improvements in grades and alignment since completed had been commenced. In light of these facts Table G affords an interesting exhibit, giving an idea of the comparative power used in the two years mentioned, and no doubt many will be surprised to find so small an increase in the power of locomotives at the end of the 15 years. These engines are, for the most part, of the American eight-wheel type, with a considerable number of Moguls. The heavier engines shown for 1894 are mostly used between Buffalo and Wakarusa, and the results shown on Table B would indicate by the record of the Buffalo Division that the grades were fully compensated by the increased power of the engines with 19 in. x 24 in. cylinders, when compared with the performance of the Standard engines having 17 in. x 24 in. cylinders allotted to the other divisions where the ruling grade is but 15.84 ft per mile.

While the weight of motive power has been thus restricted the size of rail sections has also been kept down. In 1879 the Standard section was a 60-lb. rail 4½ in. high, excepting for the Buffalo Division, where a 4½ in., 65-lb. rail was used. A few years later the use of the 65-lb. rail was extended and the section of rail for use on the Buffalo Division was increased to 71 lbs. per yard, while for the past year or two the use of the 71-lb. rail has become more general.

There is little question but a moderate increase in the capacity of its engines would facilitate a freight service which the present power handles under strain, and while a heavier rail might not improve the condition of this splendid road, yet by affording a stiffer section it would allow of the maintenance of the track in its present high standard of excellence at considerably less cost for labor.

I may say here that upon the retirement of Mr. Hardy as Chief Engineer, Mr. J. O. Osgood succeeded Jan. 1, 1888, and was in turn succeeded by Mr. G. H. Kimball in the spring of 1890, and Mr. E. A. Handy, who, as engineer of the Lake Shore Division during that period, had worked out the details of that division, assumed his present position of Chief Engineer in July, 1891.

Since the appointment of Mr. P. P. Wright as Assistant to the General Manager, the position of General Superintendent has been filled by Mr. W. H. Canniff, whose masterful management of men is well calculated to inspire an interest and at the same time enforce a discipline which cannot fail to show the very best results in the operation of this great property.

It is herein seen that while in past years, lines, through the putting off of necessary renewals and repairs have been forced into precarious makeshifts, the Lake Shore

TABLE G.—ENGINES.

| Passenger.        |              |              |
|-------------------|--------------|--------------|
| Size of Cylinder. | No. in 1879. | No. in 1894. |
| Inches.           |              |              |
| 14x22 and under.  | 25.          | 14.          |
| 15x20             | 2.           | 1.           |
| 15x22             | 10.          | 11.          |
| 15x24             | ..           | 1.           |
| 16x22             | 12.          | 12.          |
| 16x24             | 33.          | 26.          |
| 17x24             | 44.          | 104.         |
| 18x24             | ..           | 8.           |
|                   | 126          | 165          |
| Freight.          |              |              |
| 14x22             | 1.           | ..           |
| 15x22             | 9.           | 1.           |
| 16x22             | 37.          | 3.           |
| 16x24             | 122.         | 40.          |
| 16½x22            | 2.           | ..           |
| 17x24             | 118.         | 219.         |
| 18x24             | ..           | 5.           |
| 19x24             | ..           | 28.          |
|                   | 289          | 296          |

& Michigan Southern Railway, by a series of permanent improvements, has gradually funded many of the current expenses which were once necessary for the proper maintenance and operation of the property, and if through the pressure of decreasing tonnage with diminishing rates the consequent loss of revenues to the competing lines shall precipitate the threatened struggle for existence, the Lake Shore & Michigan Southern by reason of wise forethought and prudent management will prove its fitness to survive.

#### A Rocking Bascule Bridge.

In the issue of the Railroad Gazette for Oct. 20, 1893, we gave an illustration of a novel form of rocking bascule bridge. A somewhat similar one has been built over the south branch of the Chicago River at Van Buren street, Chicago. This bridge has just been opened for traffic.

The old bridge at this site, a swing bridge, divided the river into two narrow channels, neither of which was in

indicating the future earning possibilities of this great property.

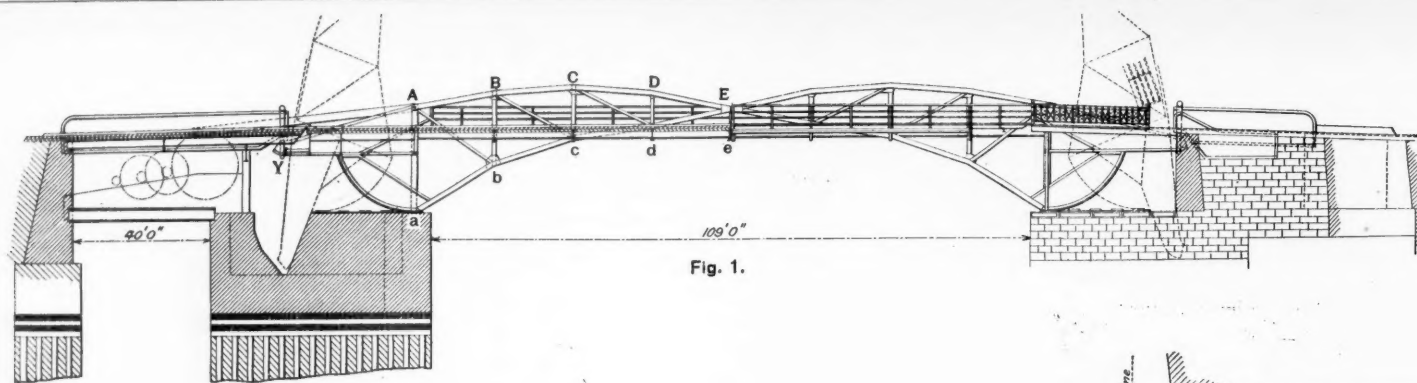


Fig. 1.

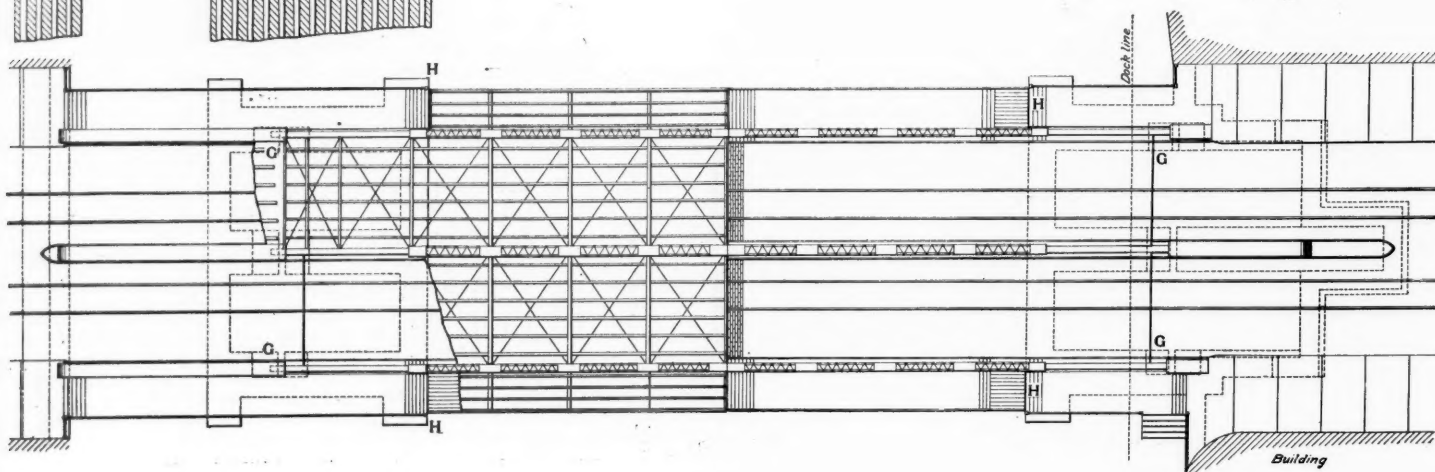


Fig. 2.

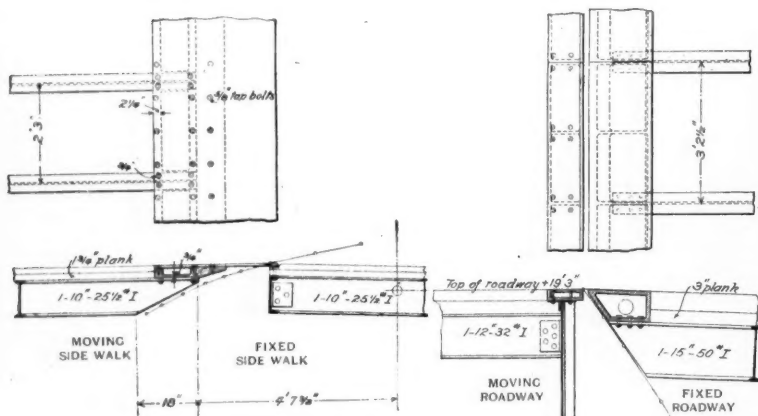


Fig. 3.

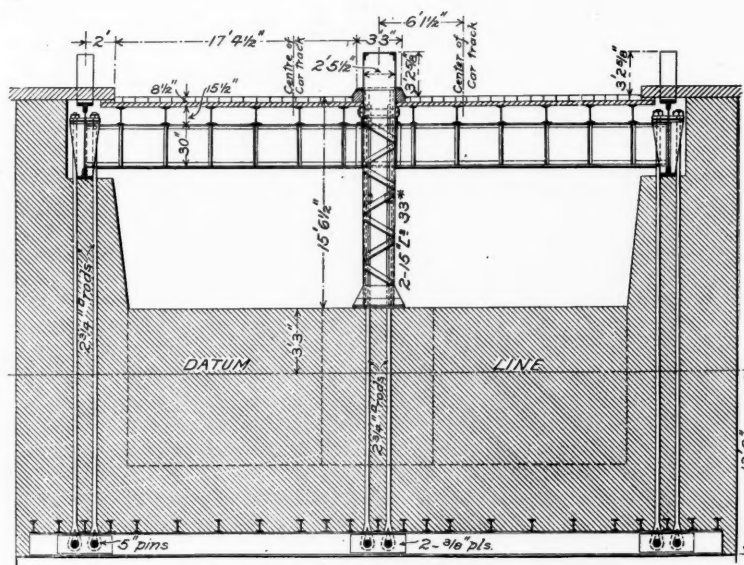


Fig. 4.

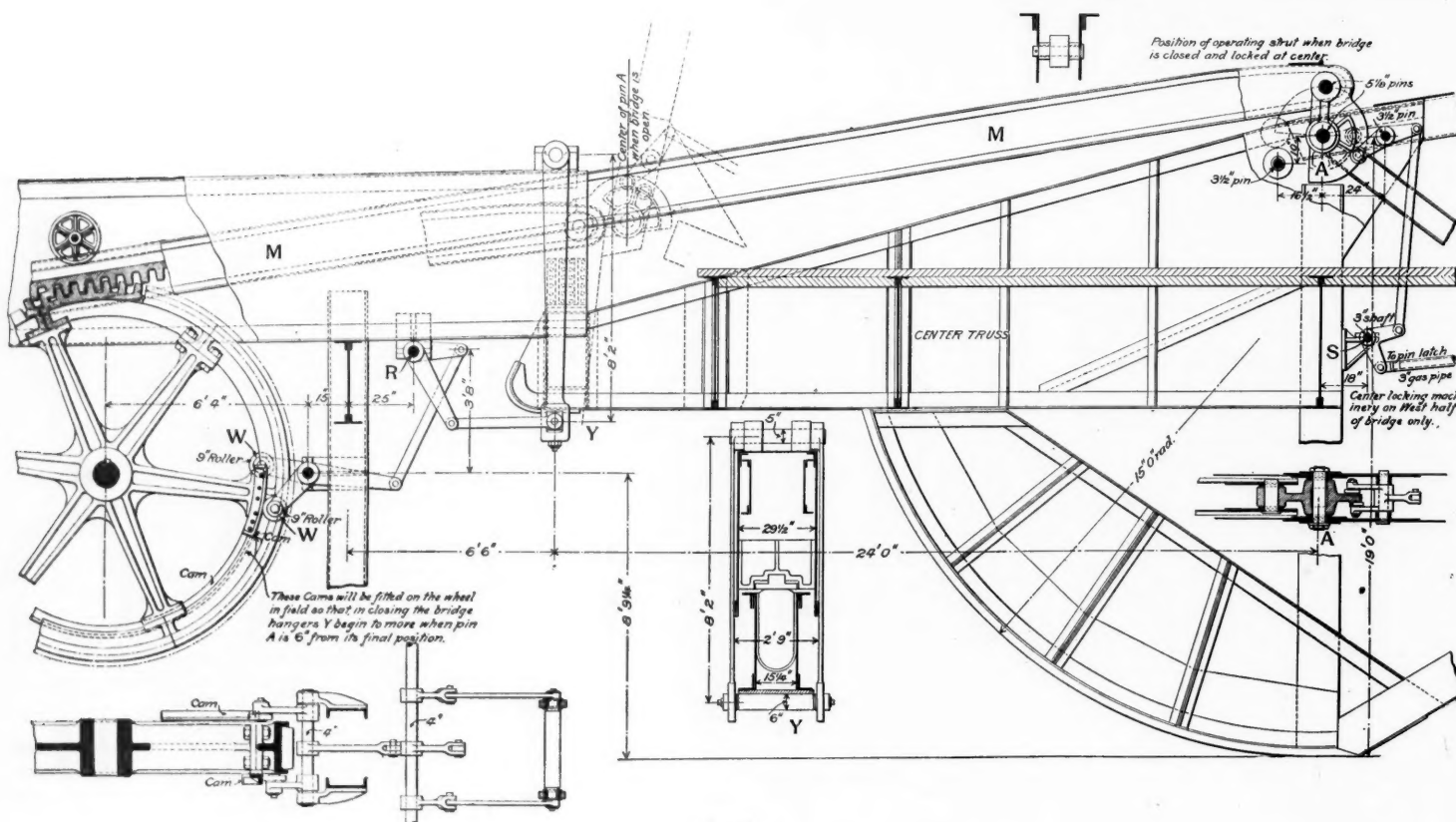


Fig. 5.

## ROCKING BASCULE BRIDGE AT VAN BUREN STREET, CHICAGO.

Mr. S. G. ARTINGSTALL, City Engineer.

Mr. WARREN B. ROBERTS, City Bridge Engineer.



a direct line with the channel above or below the bridge. A new swing bridge, even if of longer span, would not have materially improved these channels. Moreover, the Metropolitan West Side Elevated Railroad wished to cross the river at a point near this bridge, which would not have been possible if the old bridge had been replaced with a swing bridge of longer span.

A lift bridge, moving in a vertical plane would permit

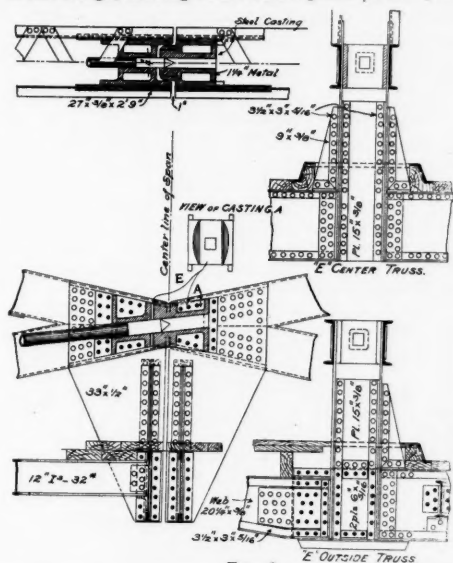


Fig. 6.

the Metropolitan Elevated road to cross the river as desired, and having no center pier, a straight channel could be maintained through this point.

Fig. 1 gives a side elevation of the east half of the bridge, and a longitudinal section of the west half. As shown, the bridge is closed ready for traffic, the dotted lines indicating the position of the bridge when fully opened. The west approach is longer than the east; the abutment and pier on the west side being separated by 40 feet, while on the east they are combined in one piece of masonry.

This space between the abutment and pier is bridged

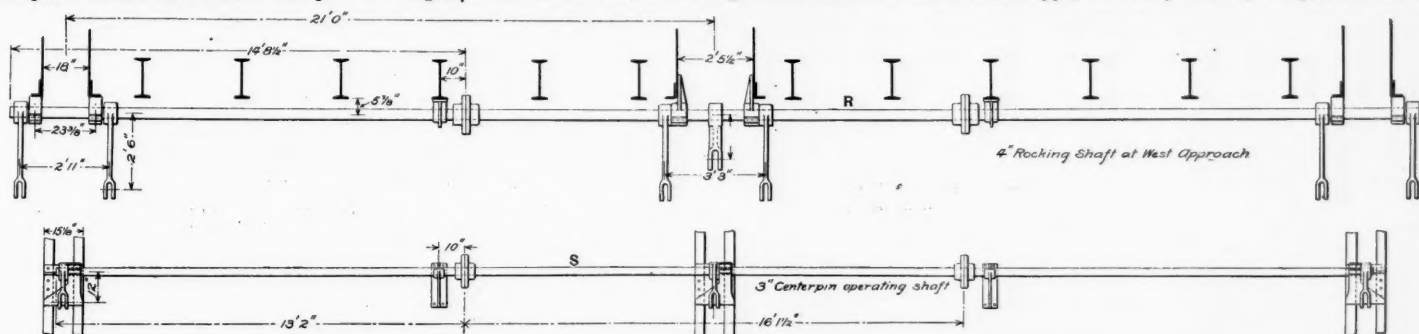


Fig. 7.

over with plate girders and forms a room for the machinery on the west side. On the east side of the river space for the machinery was provided by building a room in the abutment. In each room are placed the motors, air pumps, air reservoirs and other machinery necessary to operate one half of the bridge, and each half is operated independently of the other.

**Substructure.**—The foundation for each part of the substructure is formed of piling, driven about three feet center to center. The piles used were about 50 feet long, driven nearly to the water and sawed off 17 feet below the water line.

In building the masonry for the west abutment, the

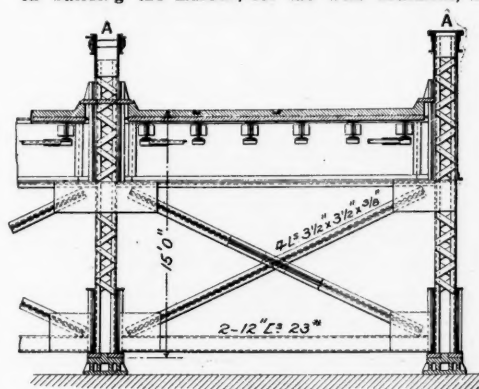


Fig. 9.

west pier, and the pier portion of the east abutment, open caissons were used. The bottom of the caissons consisted of four courses of 12 in. x 12 in. pine, and the side walls a single course of the same. Each caisson was built at a dock and filled with concrete until it sank almost to the level of the piling. It was then floated into position and the concrete continued up to within two feet of the water line. The pier was then faced up with Bedford masonry to the coping, the concrete backing for each course being put in before the following course of masonry was added. The coping was of large blocks of Bedford stone.

In each pier were formed three pockets, each to receive one of the tail girders of the moveable portion of the bridge when revolved into the vertical position. One of these pockets is shown in the section of the west pier.

Directly upon the masonry of each pier were placed three very heavy castings, each of which forms the bearing for one segmental girder.

**Superstructure.**—In Fig. 2 is given a half plan of the bridge. The sidewalks on the approach join those of the moveable portion of the bridge at *H* and *H'*, while the junction between the same parts on the roadways is at *G* and *G'*. When the bridge is raised the floor of the moveable part of the roadways passes back and beneath that on the approach, making it necessary to bring the latter to a very thin edge to form a connection when the bridge is closed. This connection was made for the full width of the roadways, with castings shown in section in Fig. 3. The movement at the sidewalk is the reverse of the above, that is, the moving sidewalk passes above the fixed part as the bridge is raised. A section of the castings for this connection is shown in Fig. 4, which castings it will be seen are the reverse of those for the roadways.

Fig. 5 shows the method of applying the power to the bridge. From the machinery runs an operating strut *M*, *M'* joined to the center truss by a pin connection. Within this strut is a rack which engages with the rack wheel. In the position in which the strut is shown, the bridge is closed. The dotted lines indicate the position of the pin connection to the truss when the bridge is open. At the time the strut is in the first position, the latch at *Y*, beneath the tail girder and the pin latch at the center of the span shown in Fig. 6, are both in the position shown, and the bridge is locked ready for traffic. The first movement of the strut backward is to revolve the cam crank at *A* which operates on a series of levers and shafts, withdrawing the pin latches. At the same time the small wheel *W* strikes the cam of the rack wheel, and the first movement of this latter wheel operating through the small wheel and the connecting levers is to withdraw the latch *Y* from the tail girders. These two duties performed the bridge is free to move, and the succeeding motion of the operating strut begins to move the bridge. In closing, these movements are simply reversed and the bridge is again locked.

There is only one set of machinery and one operating strut for each half, these being connected to the center

These castings are alike for both center and side trusses, with the exception of the transverse section of the teeth; those of the center being  $5\frac{1}{2}$  inches wide at the root and  $5\frac{1}{4}$  at the top, while those of each side are  $5\frac{1}{4}$  inches at root, and  $5\frac{1}{2}$  at the top. The top of the casting on which the sole plate bears is planed, as are also the joints between the parts of each, and the sides and ends of the teeth. The longitudinal sections of the teeth are all alike with the exception of the end ones, which are slightly longer; the outside end of tooth *A*, on which the bridge normally

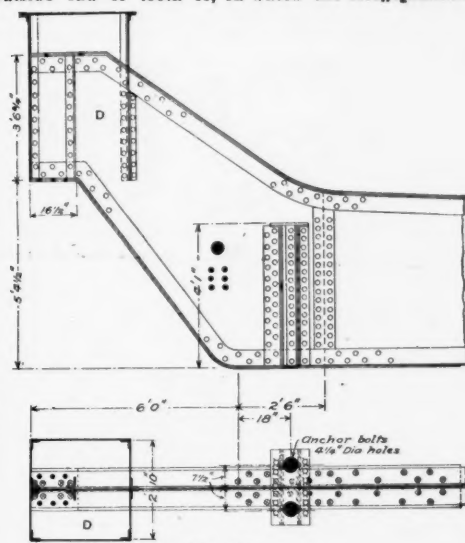


Fig. 12.

rests, having a  $\frac{1}{8}$ -inch bevel instead of a  $\frac{1}{4}$ -inch, as the rest have. This casting is hollow, and made of three parts which are bolted together.

**Motors and Machinery.**—The machinery and motors are shown in the photograph, Fig. 14. There are two 50-H. P. Westinghouse street car motors on each side of the river, hung on the same shaft and wired to operate in unison or separately.

On each end of the motor shaft is an automatic brake wheel. The brakes on these wheels are of the Prony brake type, and are operated by compressed air, the air

truss. Each truss is locked in the same manner as the center one, the rack shafts *R* and *S*, Fig. 5, extending the entire width of the bridge, and operating similar sets of levers under each truss. The arm from *A* to the center acts as a cantilever, the tail girder being the anchor, is held down by heavy anchor rods, shown in the section of the east approach, Fig. 8. The bridge from *A* to the approach acts as a simple span, being supported at the approach by the tail girder hangers *Y*, Fig. 5.

In raising the bridge the power from the operating strut is carried from the center truss to the two outside trusses by heavy vertical bracing between the posts, as shown in Fig. 9.

Within the tail girders and between them, beneath the roadway floor, are placed the weights for counterbalancing the bridge. These weights are sufficient to prevent the bridge from coming to a horizontal position when freely lowered by the brakes. The bridge when so lowered comes to rest a little above the horizontal; the current is then applied, and the motors force the bridge down to a level.

The details of the segmental and tail girders for the center truss—which does not differ materially from the side ones—are shown in Fig. 5. At the extremity of the tail girder, which engages the girder of the approach to prevent vertical motion when the bridge is down, an oak block is placed, forming the bearing on the tail girders. This is shown in the details of the catch *Y*, Fig. 5. The sole plate on the bottom of the segmental girder is 3 in. thick, bolted to flange angles on the girder with 1 in. turned bolts. Like the webs of the girders, it is of mild steel, and is bent to circular form. Its face is pierced with 6 in. by 12 in. spaces, 1 ft. apart. Fig. 12 is a detail of the fixed girder which engages the tail girder of the bridge. In the end *D* is a steel casting against which the tail girder bears. This casting is also shown in Fig. 5, where the oak block in the tail girder is also shown. This girder is firmly held to the masonry of the foundation by anchor bolts previously mentioned and shown in Fig. 8. In Fig. 13 is shown the steel casting fastened by 3-in. anchor bolts to the foundation and forming the bed for the segmental girder to roll on. As can be seen it has teeth which fit into the holes of the sole plate of the girder.

compressors being operated by an eccentric on the end of the motor shaft. If at any time during the motion of the bridge the current is cut off, these brakes are automatically applied. In addition to these brakes, there is an emergency brake on the center of the first shaft, back of the motor shaft, which may be set at any time by opening an air valve leading from the air reservoir to this brake cylinder. This brake is intended to be used only in case of accidents. Fig. 15 gives the details and general plan of the arrangement of gears and motors. There has been some change made since this drawing was prepared, the brake wheels being put on the outside of the pinions and two motors being used instead of one. See photograph. The power is supplied by the Chicago Edison Company, special wires running from their plant at Washington and

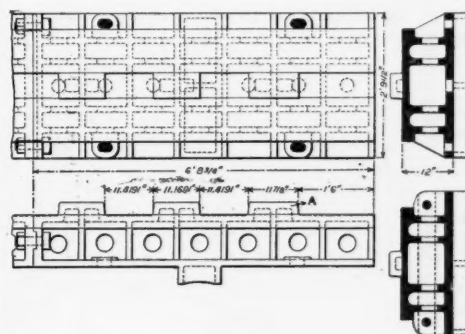


Fig. 13.

Market streets. These gears are supported on a box girder fastened to the foundation by 2-in. anchor bolts 3 feet long.

Of the machinery shown in Fig. 15 the gear wheels are all of cast steel, excepting the spokes and hub of the rack wheel, which are of cast iron, as are also the journal boxes.

On top of the center girder on each approach is located the operators' house. To each of these houses run all the electric cables and air pipes for controlling one-half of

the bridge, the operator having here before him all the apparatus necessary for this purpose.

The bridge gates on the right hand roadway at each end of the bridge and the signals at the center of the span are also operated by compressed air. The air for use on both sides of the river is compressed on the west side, that to be used on the east side being piped across beneath the river and stored in a reservoir.

**Construction and Cost.**—The bridge was designed and patented by Mr. Wm. Scherzer, who died before the drawings for it were entirely completed.

The average fare per mile fell from 1.83 cents to 1.80 and the average rate per ton per mile from 1.39 to 1.33. These slight reductions in average rates account for the total deficit for the year (which was \$1,799,873) almost exactly.

The report contains a table showing the gross receipts of the roads reporting to the Board, for the past 40 years, accompanied by diagrams showing graphically the fluctuations during that time. The depressions of 1857, 1861, 1873 and 1884 are clearly shown. While the Commissioners do not undertake to philosophize much on these sta-

instead of pursuing the usual method of melon-cutting; the company has realized over \$3,000,000 in this way.

The special report of Professor George F. Swain on the railroad bridges of the State contains the usual tabular statements and careful notes of inspection, but nothing out of the ordinary.

The accident statistics are made up by Secretary Crafts, who presents interesting comparisons with past years and with English accident returns. In Massachusetts for the year ending June 30, the totals were:

|                                | Killed. | Injured. |
|--------------------------------|---------|----------|
| Employees.....                 | 53      | 547      |
| Passengers.....                | 18      | 128      |
| At crossings and stations..... | 25      | 58       |
| Trespassers.....               | 136     | 149      |
| Total.....                     | 232     | 882      |

The Chester bridge disaster, in which nine passengers and five employees were killed comes within this report. The published reports at the time showed 14 passengers and six employees injured in this disaster, but in the annual return of the company it is stated that 87 persons were injured more or less seriously. This statement affords a glimpse of the difference between the number of casualties as estimated by the newspaper reporters (who, certainly, are not generally inclined to make the number too small) and as it appears to the railroad lawyer who has to deal with the claims presented for damages. Mr. Crafts estimates that the number of passengers carried within the State of Massachusetts during the year was 87½ millions, so that the ratio of killed in train accidents to the total number carried was one in 9,722,222 and of the number killed to the miles traveled, one in 144,406,203. The number of passengers killed by their own negligence or want of caution was precisely the same as the foregoing. Four-fifths of the employees injured were trainmen. Four were killed and 253 injured in coupling or uncoupling, a very favorable showing, compared with 1893. Of the 17 employees injured by coming in contact with overhead bridges, etc., none were fatally hurt, whereas in 1893 ten were killed and 34 injured. The decrease in coupling accidents may be partly due to the increased use of automatic couplers, but both these and the bridge accidents have no doubt decreased mostly on account of the falling off in business. The number of persons killed and injured at grade crossings is rather less than the average for the last 10 years. The number of crossings protected by gates or flagmen is 1,085, and of unprotected 1,088, and the average number of accidents for the last 10 years was about the same for each class of crossings; but of course the number of travelers is very much greater at the protected crossings. The accidents to trespassers increased about 16 per cent.

The report contains a chapter on the need of careful instruction of trainmen and other employees, the investigation of an accident at Sharon Heights, May 30, having shown that some employees did not know important rules. The practice of the principal roads in the State was inquired into at that time and it was found to be rather loose. The Commissioners at the same time in-

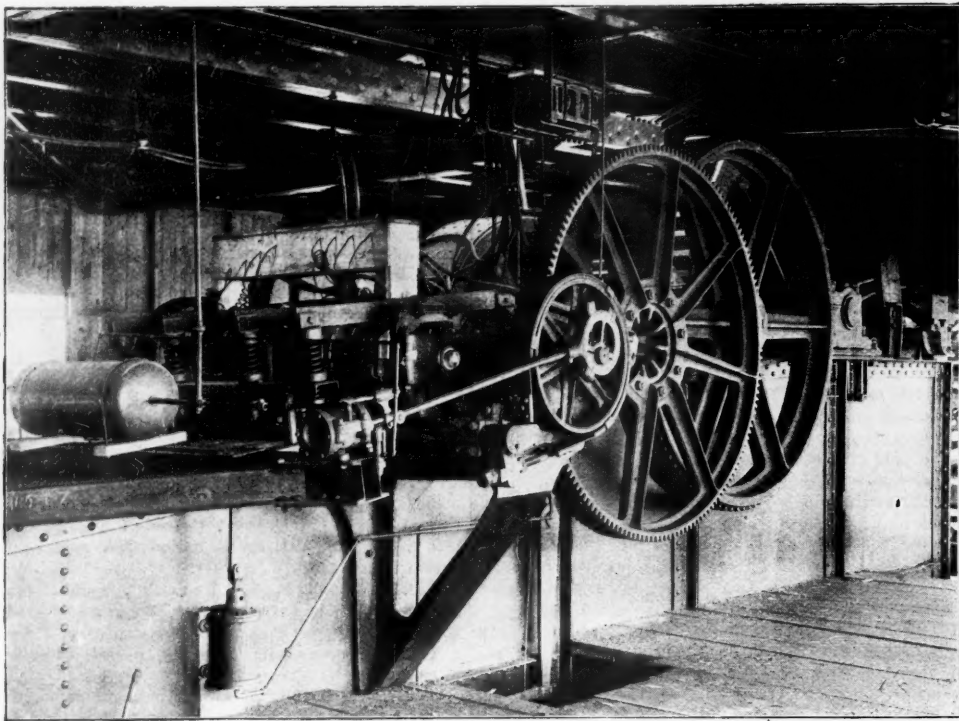


Fig. 14.—Machinery of Bascule Bridge.

Work was begun on this bridge early in 1894, and the bridge was opened for traffic Feb. 4, 1895.

The substructure was built by the Fitz-Simons & Connell Co. of Chicago. The east pier and abutment, which came between two seven-story buildings, and the excavation for which was considerably below the foundations of these buildings, was especially difficult of construction. This work was all done very successfully and with credit to the contractors.

The contract for the superstructure was originally let to A. Gottlieb & Co., but Mr. Gottlieb's death very soon afterward made it necessary to re-let this work, and it was given to Mr. Charles L. Strobel, of Chicago. Mr. Strobel had the work manufactured by the Elmira Bridge Co., of Elmira, N. Y., who sub-let the machinery to the Scaife Foundry & Machine Co., of Pittsburg.

The electrical equipment, including the brakes, air compressors, gates, signals, etc., was furnished by G. P. Nichols & Bro., of Chicago.

The bridge was constructed under the supervision of Mr. Samuel G. Artingstall, City Engineer. Mr. Warren R. Roberts, City Bridge Engineer, having direct charge of the work.

The total cost of the bridge, including the approaches, the electric equipment and the cables to the power house was \$169,700.

#### Massachusetts Railroad Commissioners' Report.

The Railroad Commissioners of Massachusetts, John E. Sanford, E. A. Stevens and William J. Dale, Jr., have issued advance sheets of the 26th annual report of the Board. The steady process of consolidation during the past 20 years has now placed Massachusetts in a condition similar to that of Connecticut, in that five companies operate nearly all its railroads; these five control 95 per cent. of the mileage and do more than 98 per cent. of the business. No new railroad was constructed during the year, and the length reported is 2,118 miles; this is one mile less than last year, in consequence of remeasurement. The companies operating in Massachusetts operate 2,213 miles outside of the State, but it is estimated that 80 per cent. of their traffic is done in Massachusetts. The railroad mileage of Massachusetts includes 47 miles of narrow gauge. The statistics are for the year ending June 30, 1894.

The report contains a list showing the decrease in 1894 from 1893 in the principal items of business as reported by all the roads. This table shows:

|                         | Decrease. |
|-------------------------|-----------|
| Passenger miles.....    | 6.87      |
| Ton miles—freight.....  | 10.02     |
| Passenger receipts..... | 6.54      |
| Freight receipts.....   | 13.24     |
| Total receipts.....     | 9.60      |
| Operating expenses..... | 10.18     |
| Net earnings.....       | 8.25      |

The per cent. of expenses in 1893 was 69.79, in 1894 it was 69.34. The average rate of dividend declared in '94 was the highest for 19 years, 5.84 per cent., but the dividend earned was only 4.89, nearly two millions having been taken from the surplus to pay dividends.

istics, they call attention to the fact that in business panics freight traffic is the first to fall off, but revives more quickly than the passenger; the passenger traffic and the gross receipts (from both freight and passenger) decline and revive on parallel lines not far apart; the gross revenue falls off more than either kind of traffic, showing a reduction of rates, which in each case has proved permanent.

The Massachusetts legislature passed many new laws in 1894, among them a number which make substantially a new system of statutory regulations for the increase and

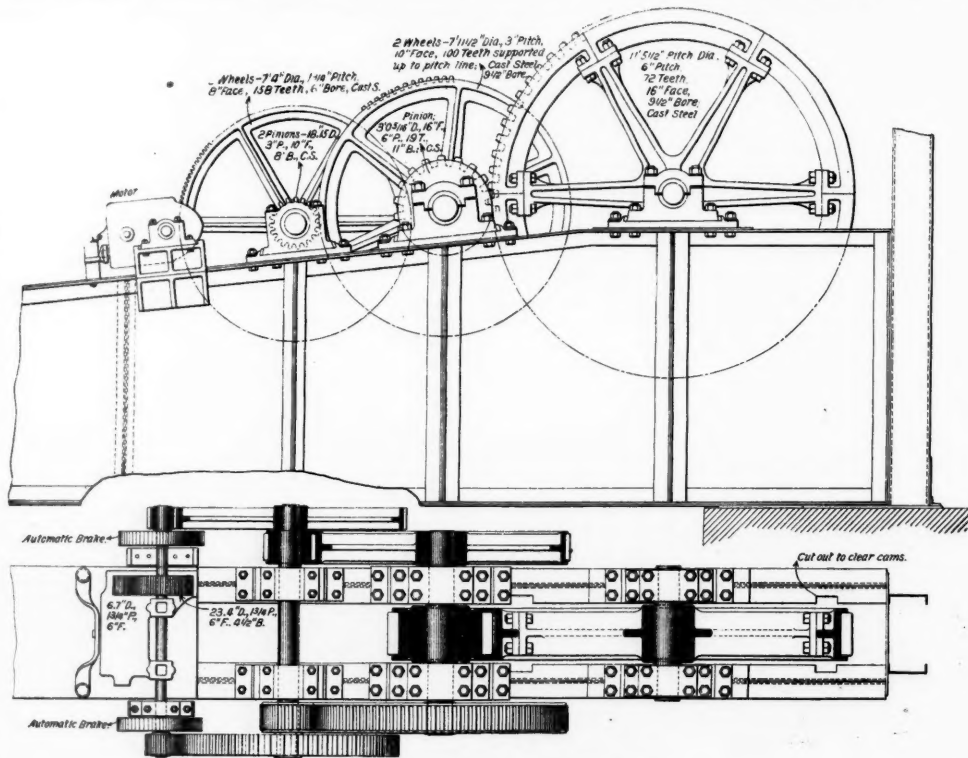


Fig. 15.—Machinery of Bascule Bridge.

issue of stock and bonds, payment of dividends, conditions of leases, etc. These laws were made to guard against the dangers of constructive and gratuitous capitalization and to discourage speculation. They impose upon the Board new duties, and in the latter part of the report an additional clerk is asked for chiefly on this account. The Commissioners express no opinion as to the efficacy of the new laws except to say that the publicity which they will compel is likely to be beneficial. Commendatory reference is made to the Old Colony, which for 15 years has sold its new stock at auction

quired of the Pennsylvania, the Chicago, Milwaukee & St. Paul and other roads, and concluded that their practice had better be imitated more than it is by the Massachusetts roads, though they say this indirectly. The statement from the Pennsylvania seems to show that no men are placed on the road as brakemen until they have first shown a good record as a freight brakeman in a yard.

The legislature a year ago requested the Commissioners to see how well the railroads were getting along in the matter of automatic couplers for freight cars, and to report if any legislation seemed necessary. It was found



that the companies operating in the State, including the Central Vermont and the Concord & Montreal, have 48,935 freight cars, of which 11,342 have M. C. B. couplers. The Boston & Albany has 83.5 per cent. of its cars equipped, and the New York, New Haven & Hartford 31.7 per cent., but on all the others the percentage is small. It appears that some companies are deliberately postponing compliance with the national law in this matter, because they have a considerable percentage of old cars which it will not be worth while to equip with new couplers. The New York & New England makes a definite report to this effect and states that 1,200 new cars with automatic couplers are being built. The cost of equipping a new car with M. C. B. couplers in Massachusetts is \$26, and for an old car \$30. At an average cost of \$28 the roads reporting will have to spend \$913,640 for this purpose on the number of cars they now have. As some cars are run entirely in Massachusetts the Commissioners say that if the legislature wants to pass a law it had better require the roads to comply as regards these cars with the provision of national law.

Of the 1,926 locomotives reported by six roads, 1,398 (72.7 per cent.) have driver brakes; of the 39,826 freight cars 6,018 have automatic air brakes. The Boston & Albany has 45 per cent. equipped, the Boston & Maine only one per cent., and the average of the six roads is 15.3 per cent.

The Commissioners have appointed three inspectors authorized by the law passed a year ago. They are assigned to territorial districts, so that no inspector shall seem to sustain a special relation to any particular road. Nothing definite is said about the results of their work.

draft rigging which is shown in side elevation in Fig. 3. Figs. 1 and 5 illustrate the interesting plan for the attachment of the body bolster. The bolster is similar to the one used on the C. B. & Q. freight cars. Figs. 6 and 7 show the attachment of the front draw-head to the sills and the safety chain attachment.

On the back end the draw-bar pulls directly on the center sill through the draft attachment and spring. On the front end the draw-bar passes through the bumper and is attached by a large pin to the casting shown, which is riveted between the center sills and is further strengthened by steel straps of U-form,  $\frac{1}{2}$  inch thick and 10 $\frac{1}{2}$  inches wide, as shown in Figs. 6 and 7.

The sills are attached to the transoms by two U-shaped brackets, 8 by  $\frac{1}{2}$  inches, as shown in Figs. 1, 3 and 5. The transom is one of the deepest used in this country, being 14 $\frac{1}{2}$  inches over all at the center. The compression member is 8 by 1 inch, and is held from buckling by the intermediate sills, as shown in Fig. 5. The side sills are held in a stirrup formed of the top member of the transom, as shown in Fig. 5.

Taken altogether, this tender frame is an admirable design, and looks like a step in the right direction, that is, toward the use of steel center sills on all railroad equipment. Further comment will be found in the editorial columns.

#### Transition Curves.

The interesting paper read by Mr. Edwin E. Woodman, before the Civil Engineers' Society of St. Paul, on Oct. 1, 1894, and published in the December issue of the

Mr. Woodman, by the use of the general formula for the radius of curvature, deduces its value by the calculus. He also appends an approximate method, as follows: Take one minute of any circular arc as unity, then the radius of that circle will be 3,438 to the same scale. Hence  $R=3,438 m$ , where  $m=1'$  of circular arc. Hence, supposing one minute of arc of the transition curve at any place to coincide with a circular arc, we obtain  $R$  by substituting for  $m$  the length of that minute of arc.

The value of  $T$ , the total angle of the transition curve, may be deduced from the formula.  $\text{Tang } T = \frac{y}{Tx}$  where

$Tx$ , the subtangent, has its value  $\frac{x}{n}$  but the table given

by Mr. Woodman furnishes these values at once. To find  $R$  by the approximate method, obtain  $T$  for a number of values of  $x$  having a common difference, say 10 ft. The corresponding increase in length of the curve will also be, practically, 10 ft. If  $T$ ,  $T_1$  and  $T_2$  be three consecutive values of  $T$  in minutes,  $m = \frac{10}{T_1 - T}$

and

$$R = \frac{34,380}{T_1 - T}$$

This is the average radius of the curve between the tangent points of  $T$  and  $T_1$ . Repeat for  $T_2$  and  $T_1$ . Then the average of these two values of  $R$  may be taken as the radius of curvature at the middle point  $T_1$ . The equation  $y = ax^3$  is that of the cubic parabola, and like other spirals of this form, is simple in its mathematical features.

The matter of regulating elevation and depression of rails as well as alignments and grades should be in the hands of an engineer. Otherwise, the ends of every

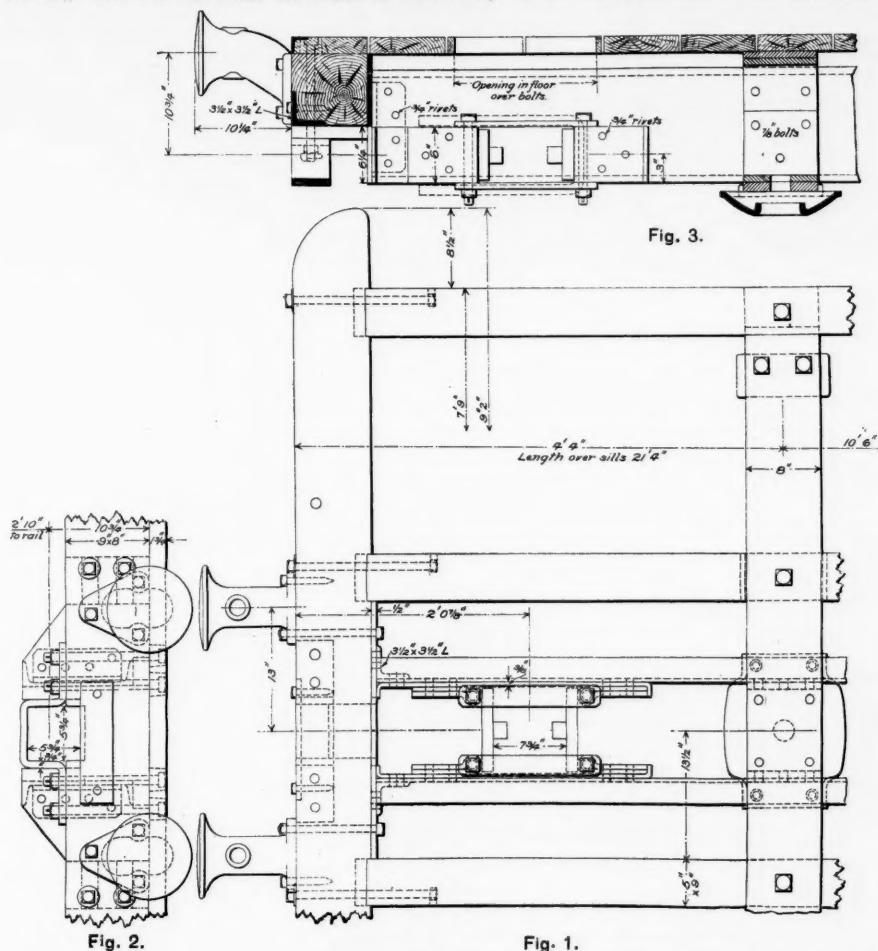


Fig. 2.

Fig. 1.

Tender Frame with Steel Center Sills. Class H Engines. Chicago, Burlington & Quincy Railroad.

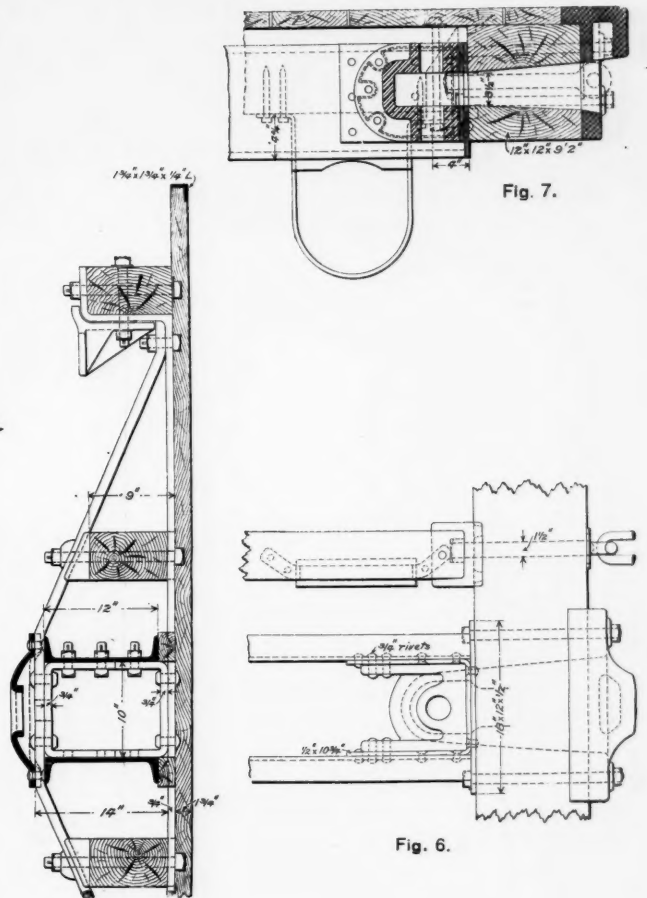


Fig. 7.

Fig. 6.

Fig. 5.

but the Commissioners believe that they will prove useful.

The increase in the number of locomotives owned, over the previous year, was only one, as against an average annual increase of 57 for the last 10 years; the number of passenger cars has increased 63, as against an average for 10 years of 121. The average number of persons employed during the past year was 46,727, decrease of 2,104 from the previous year. The total estimated cost of the abolition of grade crossings, under the law of 1890, in all cases in which special commissions have thus far made reports, now amounts to \$3,897,311 of which the State is pledged to pay \$974,328. Only \$478,359 had actually been paid out by the State up to Jan. 1, 1895.

#### Steel Center Sills on the Burlington Tenders.

The interest developed in steel center sills during the last few years has led, on the Chicago, Burlington & Quincy, to an experiment with steel center sills for tenders, as is shown by the illustration. It is intended that these steel sills shall act like a continuous draft gear as none of the pulling strains comes upon the wooden sills. Briefly, the construction is as follows:

Two 12-inch channel irons with the backs inward extend from end to end of the tender; they weigh about 24 pounds per foot. Fig. 1 shows the plan of the sills, and the attachment of the draft rigging, which is of wrought iron, and the C. B. & Q. standard for freight cars. Fig. 2 shows the draw-bar carrier and an end elevation of the

Journal of the Association is, with the discussion, a real addition to the literature of the transition curve and its use.

The curve whose equation has the form  $y = ax^n$  is recommended because of its simplicity and facility of application. By keeping  $n$  greater than 1, thus making the curve convex towards the axis of  $X$ , we may assign different values to  $a$ ,  $x$  and  $n$ , thereby varying the radius of curvature from infinity at the origin or common tangent point to a value at some point  $P$ , equal to the radius of the simple curve to which it is to be applied. The distance of  $P$  from the tangent point should be such that the original curve will not be lengthened by more than 200 ft. at each end. We give the elements of three of these curves, the first applicable to circular curves up to 1°, the second up to 3°, the third up to 10°. Each one is made applicable to several circular curves by cutting it at the proper radial points.

In forming these curves, such a value has been assigned in each case for  $a$ , that when  $x$ , the abscissa of  $P$ , = 100 ft.,  $y = 0.22$  ft., which is the departure of a 15° curve from its tangent, at a distance of 100 ft. from the beginning of the curve. Also,  $n = 2\frac{1}{2}$ , 3, and 4, and the equations become,  $y = ax^{\frac{5}{2}}$ ,  $y = ax^3$ , and  $y = ax^4$ . The value of  $a$  is chosen, partly, to form curves applicable to the circular curves in common use, such as 2°, 2 $\frac{1}{4}$ °, 2 $\frac{1}{2}$ °, etc., and partly on the consideration that the transition curve will certainly not apply below a 15° curve. Thus by varying  $a$ , the curve is made flat or sharp at pleasure. With a constant, the sharpness increases in the order of the powers of  $x$ .

transition curve should be plainly marked for the section foreman, either by posts set at the side of the track, or by white paint on the rails. Thus deformation of the curve ends may be detected by proper inspection.

During the discussion Mr. Archibald Johnson, in speaking of practice on the Northern Pacific, said that Assistant Chief Engineer D. C. Lindsay required the locating engineers to flatten all curves of more than  $\frac{1}{2}$  degree, by commencing with a 30' curve and compounding to a curve  $\frac{1}{2}$  degree greater with every 50 ft. run, reaching the maximum curve 4 degrees at 350 ft.

Mr. W. J. Wilgus referred to a table calculated by him to overcome cumbersome field methods, and based on the principle of the cubic parabola, by which table, curves up to 14 degrees may be laid out with the tape or transit. This is given on page 687 of the *Journal*.

Mr. J. S. Sewell, M. Am. Soc. E., showed that instead of assuming a constant value for  $a$ , a transition curve may be fitted to a circular curve by assuming a given length for the portion of curve to be replaced by the transition curve, as was done by him upon lines of track from Hudson to Stillwater, twenty-three years ago.

Mr. C. W. Sanders of Los Angeles, Cal., mentions the use of easement curves by the Atlantic & Pacific Railroad through the mountains. The method was similar to that mentioned by Mr. Johnson.

Mr. Charles Harlowe writes that spirals are an absurd refinement, since the gentleman from Brin or Scandinavia will put them in to suit himself. Mention is made of a method used on the Lake Shore & Michigan South-



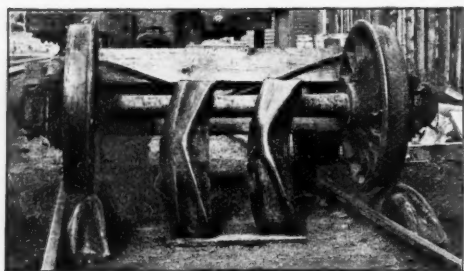
ern, by which a survey of the old curve is platted to scale, and on this plan, a curve with suitable transition is fitted by trial. Up to 4 degrees this method was satisfactory.

Mr. M. D. Rhame, Assistant Engineer Northern District, Chicago, Milwaukee & St. Paul Railroad, expresses himself as heartily in favor of the transition curve, which he has used with very satisfactory results on that road for three years. The Searle's spiral is used, which method has also been adopted and used for the past four years by the Northern Pacific. Blue prints of detailed instructions and full tables of spiral tangents and long chords, for chords increasing by 1 ft. from 10 ft. to 50 ft. are furnished to all assistant engineers.

Mr. W. R. Hoag, C. E. (Professor of Civil Engineering, University of Minnesota) compares the method of Mr. Woodman very favorably with the more complicated systems which he had previously used in class-room instruction.

#### The Alexander Car Replacer.

We illustrate herewith a locomotive and car replacer which is in constant use on the Delaware, Lackawanna & Western, New York, Ontario & Western, Delaware & Hudson Canal Co's road, and on several other railroads. In practice, two of these replacers are used, one being higher at center than the other. These are placed one on the right hand side (looking toward the wheels, as in the accompanying cut) of each rail, the higher one on the



Alexander Car Replacer.

outside. This relative altitude of the two guides is for the purpose of depositing first the left and then the right hand wheel successively on the rails.

The curving of the inner edges, or those which lie next to the foot of the rails, permits either end of the guide to be adjusted further from or nearer to the rails without throwing the central portion out of operative adjustment.

The bottom of each replacer is provided with teeth at the ends so that the weight of the wheel in passing over the guide will cause the teeth to sink into the ties, thereby preventing the device from sliding.

The replacers are hollow and made of pressed steel, weighing together 120 lbs. and are guaranteed to carry a weight of 100 tons. The inventor is Robert E. Alexander, of Forest City, Pa., and they are manufactured and sold by the Alexander Car Replacer Co., of Scranton, Pa.

The company calls attention to a circular which it is at present sending out relative to an alleged infringement of another patent, and assures its customers that they will be fully protected.

#### Some Mountain Railroads.

At the meeting of the Institution of Civil Engineers on Jan. 8, a group of papers on mountain railroads was read. We copy abstracts of them from *The Engineer*. The reader is warned that although the past tense is used throughout, these are all existing and working railroads.

**The Stanserhorn Railway.**—The first paper, by Mr. Sigvard Johnson Berg, Assoc. M. Inst. C.E., was entitled "The St. Gothard Mountain Railway and the Stanserhorn Cable Railway." The Stanserhorn Cable Railway, ascended from the Lake of Lucerne to near the summit of the Stanserhorn, 6,230 ft. above sea level. The line was divided into three sections, with a power station at each division. By this means a better alignment was obtained than would have been possible if one cable had been used throughout. The capacity of the line for traffic was also increased, and the length of the cables reduced. The motive power was electricity, generated by a hydraulic motor at a distance of 2½ miles. The generating station also supplied power to other consumers. The power stations were furnished with steam engines as a reserve. The line had two rails, except at loops, midway of each section, where the "up" and "down" carriages passed. The gradients on the lowest section commenced with 1 in 12.5, and ended with 1 in 3.7. The other sections both began with 1 in 2.5 and ended with 1 in 1.6. The speed on the first section was 6½ ft per second, and on the others about 4½ ft. per second. The whole journey occupied about 45 minutes, each section taking about 13 minutes. Each section had a fairly straight alignment, the highest section having the greatest curvature, amounting in all to 56 degrees. The points at the passing places were automatic, the outer rail being continuous in each case, and the wheels on one side of each carriage having double flanges, while the other wheel was without flanges. No rack was used, this being considered a source of danger on such steep gradients from the possibility of the pinion mounting the rack teeth. The longitudinal section of the line approached closely to the ideal profile requiring uniform motive power. The gage was 1 metre. Steel sleepers weighing 51 lb. were used on the lowest section, with rails of 40 lb. per yard, in 10 metre lengths, spaced 1 metre apart. The permanent way was anchored by vertical joints in blocks of concrete at every fourth rail joint. On the two upper sections the permanent way was the same, except that iron angle bars, 5 in. by 3½ in. by 5 ft. long, were used as sleepers. The cable on the lowest section was 0.9 in. in diameter, weighing 4½ lb. per

lineal yard, and having a breaking strength of 24½ tons. The cables of the upper sections were correspondingly heavier. The stress on the cables in the lower section, with a fully loaded car ascending, was 3,873 lbs. at starting, and 3,942 lbs. at the end of the journey. A telephone wire was carried long the line, so that the conductor could signal to the engine house from any point on the line. The cost of the line was £28,000, and the builders contracted to work it for the sum of £1,500 per annum, paying all expenses except the renewal of cables and insurance of the passengers. In an appendix statistics were given of a number of Swiss mountain railways, classified according to the methods in which they were operated.

**The Monistrol-Montserrat Rack Railway.**—The second paper, by Mr. Alfred Collett, M. Inst. C.E., was entitled "The Monistrol-Montserrat Rack Railway." This line conveyed visitors and pilgrims to the famous monastery of Montserrat, in Catalonia, eighteen miles from Barcelona. It commenced 632 ft. above sea-level, and terminated at 2,360 ft. The first intention was to use the Fell system, but the rack was considered more suitable to the steep gradient and to the traffic, which mainly consisted of passengers. There was one intermediate station. A longitudinal section of the line showed the heaviest gradient to be 1 in 6.6, on which there was one tunnel 656 ft. long, and on a curve of 213 ft. radius. The gage was 1 metre. The rails were of steel, weighing 40 lb. per yard, on transverse steel sleepers, 6 ft. long, which weighed 59 lb. each, placed 3 ft. apart, except at rail-joints, where the distance was only 1 ft. 6 in. The rack was formed by two ½ in. plates carried by chairs bolted to the sleepers. The permanent way was anchored at intervals by rails driven into the ground behind the sleepers. The ballast was of broken stone retained by dry stone walls 18 in. high and 10 ft. apart. Retaining-walls were also built of dry stone where banks had to be retained.

The engines had two pairs of leading-wheels loose on their axles, the same axles carrying pinions of 17 in. diameter, which geared with the rack and were driven by two cylinders of 12 in. diameter and 22 in. stroke. There was also a trailing axle. The engines weighed 17 tons loaded and 13 tons light. The consumption of coal was 40.8 lbs. per mile, but this might be reduced. The tractive force of these engines was 13,000 lbs., and was sufficient to take two carriages of 11 tons each on the 1 in 6.6 gradient at 4.3 miles per hour. It was intended to obtain heavier engines.

The carriages were of two kinds, both on bogie frames, the one kind carrying sixty passengers, and the other fifty with a luggage compartment. A hand-brake was fitted to each carriage, to be worked by the guard, consisting of a pinion geared to the rack and checked by a band applied to the rim of a pulley on the same shaft. The locomotives had similar brakes on the two driving pinions, independent of each other, and also an air brake, in which the steam cylinders were used as air pumps, a jet of cold water being injected to cool the compressed air. The line was constructed in twelve months, and was opened in 1892. As a rule, twelve trains were run daily in the season. An appendix to the paper furnished statistics of numerous mountain railways on various systems.

**The Usui Mountain Railway, Japan.**—The third paper, on "The Usui Mountain Railway, Japan," was by Mr. C. A. W. Pownall, M. Inst. C.E. The earlier railways constructed in Japan involved no heavy inclines, except where the trunk line from Kobe to Tokio had to gain an elevation of 1,400 ft. in fourteen miles, in passing near the base of the mountain of Fujiyama; this was accomplished with a maximum gradient of 1 in 40, extending without a break for six miles.

The railway here treated of was made to connect Tokio with the west coast of the main island. In doing so the central range of mountains had to be crossed at the Usui Pass. By the end of 1888 the railway had been built on both sides of the mountains, leaving a gap, the closing of which presented a difficult problem. In a direct line the distance from the base to the summit of the pass was five miles, while the difference of levels was 1,830 ft., or 366 ft. per mile. The conditions were therefore more difficult than those of the St. Gothard line in the ratio of 8 to 5.

A considerable traffic in both directions across the pass existed prior to the construction of a railway, and this, it was expected, would be largely increased. The question was one of constructing an important through line, and therefore differed essentially from that of many mountain railways where only tourist or mineral traffic had to be dealt with. An examination made in 1889 proved the possibility of laying out an adhesion railway with a maximum gradient of 1 in 40 compensated for curvature, with a minimum radius for curvature of 10 chains, and with a length of 15½ miles to the summit of the Pass. About 4½ miles would have been in tunnel, but no curves of less than 43 chains radius, and no heavy bridges would have been required. The cost was estimated at about £20,000 per mile, at the rate of exchange of that time.

This proposal would have been adopted but for the accounts then received of the success achieved with the Abt system, as applied on the Hartz Mountain Railway. It was referred from the results there obtained that a load of 100 tons could be taken on an incline of 1 in 15 at the Usui Pass at a speed of five miles per hour, and it was thought by reducing the length of the line to seven miles that a saving of 500,000 dol.—£33,000—might be made. A final survey in 1890 resulted in a decision to adopt the Abt system, with a rack incline of 1 in 15 for five miles, having a passing place half way to increase the traffic capacity of the line. The aggregate length of tunnel was 2½ miles, the longest being 600 yards. All bridges and viaducts were built with brick arches, from a fear that girder construction would not offer sufficient support to the rack. The largest bridge was in four arches of 60 ft. span each the height of the central pier to rail level being 109 ft. The piers were specially designed to resist earthquakes, according to the formulas of Professor John Mile, F.R.S., and could resist an acceleration per second of 4 ft., which was 50 per cent. greater than that which broke the piers of the Kiso Bridge in the great earthquake in Japan of 1891.

The gage was 3 ft. 6 in. The rack consisted of three plates, ½ in. thick, bolted to chairs, which were again bolted to the steel cross sleepers of the permanent way. The rack bars, with chairs and fastenings, weighed 100 tons per mile, and their cost, including the sleepers, was £3,000 per mile, excluding freight and expense of laying. Details of the expenditure on the railway were given in Japanese dollars, and in sterling at the rate of exchange of 3s. per dollar. The total cost was £298,669. The tunnels formed the heaviest item, and their average cost was £23 5s. per lineal yard, besides carriage of materials, which formed a separate item. The cost, including equipment, amounted to almost £42,700 per mile.

The locomotives had three pairs of coupled wheels, and weighed 33.35 tons. The heating surface was 807 sq. ft., and the grate surface 18.5, giving a ratio of 44.5 to 1. The boiler pressure was 177.5 lb. per sq. in. The heating surface was too small to allow the engines to develop the power expected, and only from 60 to 70 tons could be

drawn in ordinary working at a rate of 4.7 miles per hour, the speed being reduced to 3 miles per hour when the load was increased to 100 tons. Great difficulty was at first experienced in keeping up steam, as it was not fully understood that the pinion cylinders should only be used as auxiliary without being allowed to rob the adhesion cylinders of the steam necessary to develop their full capacity. As there was a strong forced draft, the amount of smoke at the lower speed was found to be a serious annoyance. Other and more powerful engines had been ordered with an additional axle, with which better results were hoped for; and it was thought that, with a larger consumption of fuel and diminished draft, the smoke might be reduced. An air brake was used, and also a continuous automatic vacuum brake throughout the train. Four passenger and five goods trains had traveled each way daily on the line during the first year's working without accident.

#### The Delaware River Bridge.

Work on the Pennsylvania Railroad Bridge across the Delaware River at Bridesburg has been begun, and is being pushed as rapidly as the weather will permit.

Major C. W. Raymond, Corps of Engineers, U. S. A., in a recent report to Gen. Casey, Chief of Engineers, U. S. A., replies to a complaint made by the Philadelphia Trades' League against "various features in connection with the construction of the proposed bridge and particularly against any bridge having a clearance less than 70 ft. above mean high water." Major Raymond had recommended a channel span with 40 ft. clearance, which was increased to 50 ft. by the railroad company. He had also reported, concerning a 500-ft. draw span urged by the Phoenix Bridge Co., that a span of 330 ft., as provided in the revised plans, would accommodate the class of vessels navigating that part of the river. These plans, providing for "a channel span 500 ft. in length, with a clear head room at high water of 40 ft., and a draw-span, with a clear waterway of 125 ft., on each side of the pier, the length of each of the remaining spans to be not less than 300 ft.," were duly approved by the Secretary of War.

After examining the Trades' League pamphlet, Major Raymond concludes that the bridge they recommend, with 70 ft. clearance, and without a draw, would completely bar a very important part of the river's traffic. Elsewhere, however, they refer to a draw, showing that they consider it indispensable. They complain also that piers aggregating 100 ft. in width are to be located within a distance of 355 ft. in the deep water channel (35 ft.), of the draw. Major Raymond suggests that the League, if it desires reconsideration of the subject, should petition Congress, not the War Department. A letter from a Committee of the League, dated Jan. 15, 1895, says that "facts can be presented which will show that great and irreparable injury to commercial and other interests would be done by the erection of the bridge as proposed."

Major Raymond says that the traffic would not warrant a single span, either suspension or cantilever; hence the necessity for river piers. The draw is made necessary by the obvious difficulty and cost of obtaining suitable grades for a bridge clearing all masted vessels.

Major Raymond speaks in detail of the considerations upon which his recommendations are based, viz.: Location; clearance, which would permit the passage of all vessels but steamers having smoke stacks more than 50 ft. high, and sailing vessels with masts of a height exceeding 50 ft., and these could pass through the draw; width of channel and side spans; the width and location of the draw span, and, finally, the conclusions arrived at by a board of eminent engineers in the celebrated case of the Arthur Kill Bridge, which is analogous to the proposed bridge over the Delaware.

In reply to the statement that vessels using the draw will be unable to sail through, Major Raymond shows that vessels of the size to use the draw are always towed. Concerning the "right of the people to full enjoyment of all the natural advantages of a great river," he replies that no bridge which in the slightest degree obstructed navigation could be built over any navigable river if this right were absolute.

In conclusion, Major Raymond shows that the deliberate misrepresentations and garbling of reports found in the Trades' League pamphlet should suffice to stamp it with its true character.

#### The Electrical Equipment of the Metropolitan Elevated, Chicago.

The equipping of the power station of the Metropolitan Elevated Railroad of Chicago goes slowly on, but it appears that it will be at least two months before the road will be ready for operation by electricity. The company is now running a few cars over the Western end of the lines by steam locomotives, but has not yet opened for traffic.

The boiler plant, which is now completed, consists of two batteries of six 300 H. P., put in by the Babcock & Wilcox Co., and is quite complete in all details. Coal cars will be switched and handled by the company over its own road. The coal will be dumped into the coal storage bins which are over the boilers. Thence the coal will be fed through chutes down to the automatic chain grates which are designed to burn slack. These grates are operated by an eccentric on a shaft which runs the entire length of each battery of boilers, and is driven by a small steam engine. These are in duplicate to avoid delays in case of break down. The eccentric works a ratchet on a worm gear which will give a movement to the grate of from one to four inches per minute. At the mouth of the chute there is a movable gate lined with



fire brick by which the fireman can make his fire any depth from one to six inches. The green coal will be ignited from the top by a white-hot fire-brick arch, reaching back three feet under the boiler. The gases from the coal are also ignited by this arch making combustion complete. The burned coal is dumped from the moving grate at the back into a chute which takes the ashes down to a horizontal worm conveyor running the entire length of the boiler house under both batteries. The draft will be forced by two large Sturtevant fan blowers driven by steam engines. The stack, which is built up to the roof with brick and above that of boiler plate, is 150 feet high above the grates, and is 2 feet 6 inches inside diameter. The steam pipes are cast iron, bolted together with thin copper gaskets between the joints. All bends are made of copper pipe ending in cast iron flanges, each piece of pipe being tested for a working pressure of 150 lbs. per square inch. The condensers, tanks, boiler feed pumps, etc., are placed under the engine room floor on a level with the boilers in the adjoining wing.

The lubrication of the engines will be done by forcing oil through pipes by compressed air, the filters, air tanks, and compressors being placed in the basement. The four engines, which were built by the E. P. Allis Co., of Milwaukee, are of the vertical, cross-compound Corliss type, having one General Electric Co.'s multipolar, 500-volt generator, keyed to the crank-shaft between the cylinders. Each of two small engines drives one, 750-kilowatt generator, while the other engines drive 1,500 kilowatt generators.

The wiring of the station is not complete. The switch-board is polished black slate equipped with the General Electric Company's standard street railroad apparatus and Weston illuminated dial ammeters and voltmeters. A 20-ton electric crane built by the Morgan Engineering Company runs the length of the engine and dynamo room and is now being used to set up the engines. The two smaller units will be ready to run in a few weeks. The total electrical output of the plant will be about 6,000 H. P.

The cars, both motor and trailers, are being wired for light and heat. The heaters of the latest car-heating type made by the Central Electric Heating Co., of New York, are placed under the seats and take up very little space. They are arranged in three series of four each, being intended to consume 2,500 watts per series; or in other words, when they are all in use, will take about 10 electrical H. P. per car-hour, which means about 30 lbs. of good soft coal per car hour. The following analysis of the relative cost of heating cars by electricity and steam, although not given as final or unquestionable, is, we believe, near enough to the truth to be of considerable interest.

The heat necessary to keep an elevated car of the usual size, warm in winter weather by steam takes 10 lbs. of anthracite coal under a locomotive boiler per car-hour. The efficiency of an electric heater as shown by actual test is at the most 6 per cent. under favorable conditions; that is, it will return 6 per cent. of the heat units given out by the coal used under a stationary boiler. The heaters with which these cars are equipped will give out per hour heat units only about equal to that produced by the combustion of 2 1/10 lbs. of soft coal. The efficiency of steam heating under the ordinary conditions of train heating from a locomotive boiler is about 50 per cent. of the full heat value of the coal. This shows that it will take about eight times as much fuel if of the same quality to heat cars by electricity as by steam. In the case of steam heating, anthracite coal is used at about \$6 a ton in Chicago, while the soft coal slack used under stationary boilers will cost only about \$1.50 per ton. But the slack has less heating power, and this will probably bring the difference down so that electric heating, so far as the cost of fuel is concerned, will not be more than four times as expensive as with steam. To this, however, must be added the cost of maintenance, depreciation and interest on cost of machinery. It should be remembered that the heating goes on all the time, not only while the car is in use, but while it is standing at stations and terminal. The cars have to be kept warm all the time, as you cannot force the heating for a few hours in the morning as you can with steam.

The track is laid with 80-lb. rails from the Illinois Steel Co. on sawed ties. The rails are not bonded at the joints as is the custom of street railroads, but have an S-shaped copper wire connection to the steel superstructure below, which, together with the main rails, forms the return circuit. The out-going current is carried through copper cables from the station switchboard to a bundle of steel rails laid in the center of the track structure on strips of hard pine, the number of conductor rails decreasing toward the ends of the road. The power station is in the center of the heaviest traffic. The 48-lb. trolley rail is bolted to hard pine cubical blocks, soaked in an insulating material. These blocks are placed about eight feet apart, and hold the rail 8 inches above and 10 inches outside of the main rails. This third rail takes the place of the trolley wire used for surface lines. It supplies the current to the moving train through a flexible sliding shoe, attached to the motor-car truck, on the left side going ahead, and is connected by copper cables at intervals to the outgoing feeder rails in the center of the tracks. The present prices of steel rails and copper cables make the use of rails a much cheaper conductor, notwithstanding the greater cross-section necessary when steel is used.

The company has not laid any track or built the superstructures east of Market street. Work on the bridge over the south branch of the Chicago River, which is a modified bascule, has been stopped on account of the extremely cold weather. The motor cars built for this railroad were described in our issue of Feb. 1.

### The Storm.

Our readers already know that the country has been visited by the most serious and widespread winter storm that has occurred since the Weather Bureau was established. In the "blizzard" of March, 1888, the snow was much deeper, but the cold was neither so severe nor so long-continued, and a smaller territory was affected; but the greater snowfall made the drifts worse and the obstruction of the railroads more serious within the smaller area.

Last week's storm began to affect the railroads in the West on Feb. 7 and gradually worked eastward, being most severe in New York and Pennsylvania on the 8th, and in New England on the 8th and 9th. As in 1888, the greatest disturbance of railroad traffic was in New Jersey and Pennsylvania, and the regions south of these States, where the railroads are not prepared for deep snow.

It is wholly impossible at present to estimate the losses of traffic and the extra expenses of the railroads. The New York Central was badly blocked for a day or two and through trains were practically suspended for from 12 to 24 hours. The Pennsylvania was in about the same condition between Philadelphia and Pittsburgh. On both roads derailments occurred at critical times, making the trouble with the snow much worse. Other roads fared the same way. Freight traffic was suspended everywhere.

The temperature throughout the country, except in the Southern States, was down to zero for two days, and in the mountains and in the West it went 15° and 20° below; the snowfall was not very heavy, but bad drifts in cut<sup>s</sup> were common. The conditions were not much worse in the Northern States than further South; and, as before remarked, the Northern railroads being better equipped for coping with the snow suffered less annoyance, if not less loss of traffic. We note the most salient features of the situation on the railroads, as gathered from press despatches, following geographical lines as far as possible.

In New England trains were delayed from 4 to 12 hours, and freight was suspended for a day or two. In New Jersey every road suffered. The roads terminating in Jersey City had much trouble with their ferriesboats to and from New York, on account of floating ice in the Hudson River. For three or four days nearly every trip consumed from 30 minutes to two hours or more, and at many times it was deemed imprudent to start out at all. Trains within 50 miles of New York were kept running, but with great difficulty. Through trains on the Erie were 12 hours or more late, and many of them were discontinued. The New York Central had very bad drifts for many miles in the region of Poughkeepsie, and a collision of work trains at New Hamburg blocked both tracks on Friday. On Saturday through trains from the West over this road came into New York 10 and 12 hours late, those worse off than this being consolidated with others. A west bound passenger train of the Pennsylvania was stalled three miles east of New Brunswick on Saturday morning and the passengers are reported to have some difficulty in getting food. On Sunday the main lines of railroads in New York and Pennsylvania were open and trains running, though not very close to time. Many branches and minor roads in New Jersey and Pennsylvania were not opened before Monday.

Many trains were stalled in drifts in Maryland, and even as far South as Alexandria, Va., where seven passenger trains were snowbound. On a branch of the Central of New Jersey, near Neshanic, N. J., a passenger train was stalled for a day and a half. Passenger trains were stalled 12 hours or more in drifts near Charles town, W. Va. A train of the Norfolk & Western was stuck in a drift near Berryville, Va., and the passengers were conveyed to houses with difficulty. Near Cumberland, Md., a passenger train of the West Virginia Central & Pittsburgh had eight engines sent to its relief, but they got stuck as badly as the original train.

A train on the Dunkirk, Allegheny Valley & Pittsburg was stalled for 26 hours at a point seven miles from Dunkirk and the 28 passengers had to live on rye bread, a barrel of which happened to be in the baggage car. Provisions had to be sent to a train of the Baltimore & Ohio snowed in near Millwood, Pa.

In Illinois the temperature was lower than in the Eastern States and distress was reported from many places, passenger trains being stuck in drifts remote from stations; but the despatches give few particulars. In Nebraska and Kansas much sand drifted in with the snow, and in many places the snow plows were unable to clear the tracks. Reports from Omaha called this the greatest storm since 1877. Near Clinton, Ia., 13 trains were reported stalled on Thursday morning. Most of them were freight trains, many containing cars of live stock. Wisconsin reported railroad traffic as in bad shape, but passengers seem to have been kept at stations. At St. Paul the storm was severe, but the railroads overcame it successfully. The Northern Pacific ran most of its trains only an hour late, snow plows being kept running constantly. The officers of the Northern Pacific congratulated themselves on a train just fitted with apparatus for heating from the locomotive, by which the cars were kept comfortable while the outside temperature was 30° below zero.

A freight train was derailed on the Pennsylvania at the Gallitzin Tunnel. Near Harrisburg three snow shovelers were killed by a train. At Paoli, Pa., a passenger train ran into an empty engine. At Verona, N. Y. there was a collision of freight trains and an employee was killed.

On the Long Island Railroad on the 8th a snow plow was run into a drift too fast and the engines were badly

damaged and two employes killed. Near Washington, D. C., a passenger train of the Baltimore & Ohio ran into a stalled freight. Near Norwich, N. Y., a milk train ran into a passenger train, injuring five persons.

In the South the principal troubles of the railroads were with perishable freight, carloads of bananas having to be housed.

### Railroad Promotion 77 Years Ago.

It is not strange that those who wished to build tramways three-quarters of a century ago should have used the same arguments that railroad builders use to-day, for the great principle remains the same.

It is interesting to note the way modern promoters of railroad schemes duplicate the arguments of the promoters of the tramway schemes of that day. The modern phrase, that the railroad makes two blades of grass grow where but one grew before, had its prototype in the following quotation:

To reclaim and clothe in grain and grasses a spacious tract of land, now lying barren, desolate and neglected; to fill this unoccupied region with an industrious and hardy population; to create a profitable interchange of useful commodities between an improvable and extensive line of back country and a commercial seaport of the first capabilities, both natural and artificial.

The above was the aim of what was called a railroad in 1818, and which was to connect Plymouth, England, with the back country. The prospectus says that the road will not exceed 20 miles in length and is to begin 1,250 feet above the sea and descend "by a gradual fall of half an inch in three feet," [75.7 ft. per mile]. These economic advantages were to be secured by a railroad on which a load of from 12 to 15 tons could be drawn on the descending grade by a horse in five hours, and in the opposite direction a load of four tons in six hours. All this was to be done "without any of that exposure to injury and irregularity of conveyance to which articles despatched by sea, or the usual land routes are subject; without the least impediment from winds, rain or frost and with an incalculable saving of time, etc., etc."

The prospectus then goes on to enumerate the many avenues for trade, commerce and culture which will be opened by the proposed road and concludes with:

The formation of this road from the forest of Dartmoor will gratify the lover of his country; reward the capitalist; promote agricultural, mechanic and commercial arts; encourage house settlement; add a large quantity of improved land, strength and population to the kingdom; and finally expand into a boundless field of speculation, ever calling for fresh capital, and ever yielding new incentive to industrious emulation, local prosperity and public improvement.

### A Peculiar Gas Engine Difficulty.

A peculiar trouble encountered in connection with two gas engines, at Munich, Germany, one of 25 and one of 50 horse-power, is related by M. Trillich in the *Bayerisches Industrie und Gewerbeblatt*. After having been in operation for about a year different parts of the engines, notably the exhaust valves, were frequently found to be very much overheated, the circulation of the cooling water through the cylinder jackets was impeded, and there were often premature explosions of the gas and air charges in the cylinders.

On taking the engines apart it was found that portions of the water pipes leading to and from the jackets, and even the interior of the jackets themselves, were almost completely choked up with a scaly deposit formed by the precipitation by heat, of salts dissolved in the water, the action being in all respects similar to that going on in a feed water heater.

Since, however, as shown by thermometric measurement, the cooling water in flowing through the jackets while the engines were working, never reached the temperature at which lime salts are known to separate from the water which holds them in solution, it became evident that the precipitation must have occurred during the periods first after the engines stopped working. During these periods the flow of water through the jackets ceased, and the water which in them was raised sufficiently high in temperature by the adjoining parts of the engines to permit the separating out of the dissolved solids.

Mr. Trillich accordingly emphasizes the importance of keeping up the flow of cooling water through the jackets after the engines have been stopped until all parts of the cylinders have become quite cool. No deposit of solid matter will then take place. He recommends, also, the use of soft water for circulation through the jackets.

### Improving Prospects.

The West responds bravely to the East, says the *Iron Age*, in the matter of large contracts for rolled products. The 35,000-ton contract for the Blackwell's Island Bridge, between New York City and Long Island, is nearly matched by an elevated railroad contract about to be placed in Chicago. The year thus starts off well in great undertakings which will absorb much mill capacity. In the matter of tonnage 1895 is exceedingly promising. A very great deal of work is in sight, which is of a character indicating growing confidence in the future. This is shown by the revival in lake shipbuilding, a direction in which a large tonnage of iron and steel will be required. It would not be surprising to see a much larger movement in the steel rail trade than anybody at present anticipates. Inquiries of officials of numerous small railroads disclose the fact that they expect to purchase this year from three to four times as many rails as last year. Railroads which purchased only 3,000 tons in 1894 will this year take not less than 10,000 tons. The proportion will not hold good throughout the trade, for some of the large systems will not increase their annual purchases until times materially improve; but there are enough small lines able to moderately increase their renewals to have a marked effect on the rail trade.





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### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

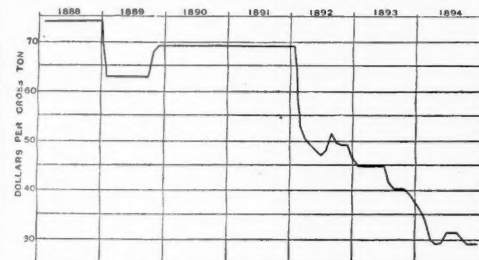
**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The report is confirmed that the Chicago, Milwaukee & St. Paul has withdrawn from the Wisconsin and Michigan Car Service Association, and has given notice of its withdrawal from the Chicago Car Service Association. In the latter association the rules require a 90 days' notice, and, consequently, the withdrawal will not become effective there until about the 15th of April; and in the meantime satisfactory assurances may be received that will lead to its cancellation by the Milwaukee road. The reason given by the officers of that company for the proposed withdrawal is that they find that their competitors in the associations have not been living up to the agreement, which is taken to mean that they have been either failing to collect demurrage from favored shippers, or have been reimbursing them in some way. If this is so—and so conservative a line as the Milwaukee would hardly take such action without abundant proof in support of its position—it is another example of short-sightedness on the part of some of the lines which the present hard times ought to correct. It is utterly incomprehensible how roads needing every dollar of income possible can, for the sake of a temporary advantage, imperil the life of so valuable an institution as the car service associations have proved themselves to be. We hope that better counsel may prevail, and that the offending lines will set themselves right before the notice of withdrawal (at Chicago) becomes effective.

The action of the Central Traffic lines in reducing the eastbound grain rate from 25 to 20 cents per 100 lbs. from Chicago to New York was probably the only thing that could be done, in the face of light tonnage and manipulated rates, but it is questionable if this rate will be absolutely maintained. It has been a matter of current report in the West for some weeks that the 25-cent basis has not been maintained at any time since it was published, except by possibly one or two roads; and that the other roads have been taking all the grain in sight at lower rates, as low as 17½ cents having been reported. It is now said that all the roads availed themselves of the "in transit" privilege to bill all the grain they could at cut rates, even below 20 cents, before the new rate became effective. Of course, none of the roads have published these low rates; consequently, they were wilfully violating the Interstate Commerce law, if they took the freight as alleged. Whether they really did, or how it was done if it was done, is one of those things which no fellow can find out (except the fellow who has a car of grain to ship, and he only knows it gets through for so much, and asks no troublesome questions). The roads have again solemnly declared that they will maintain rates. Possibly they will—if there is sufficient tonnage offered to satisfy them all. The most of the underhanded cutting is said to be done through the Mississippi River junction points between Chicago and St. Louis, where the various divisions of percentages and the numerous ways of billing afford an opportunity to manipulate the rates. The provision and dressed

beef rates are said to be even worse than the grain rates, but no serious attempt has been made to regulate these. The much advertised Chicago eastbound freight agreement does not seem to amount to any more than the host of preceding agreements that have been made, only to be broken. As long as the amount of freight to be moved is so small, there is evidently no hope of seeing any cessation of this reckless and foolish throat-cutting unless the pooling amendment to the Interstate Commerce law is passed.

A really important example of the use of steel center sills for railroad equipment, that can be said to be applicable to freight cars without important changes of dimensions, is the application to the Chicago, Burlington & Quincy tender frame given in another column. The back end of the tender frame is practically the same as a freight car arrangement, and this plan has been put into tender frames on the C., B. & Q. for the purpose of getting a severe trial in practice of the steel center sill where the results can be watched. The price of rolled steel channels is now so low that the additional cost per car for steel center sills is too small to make them an important factor in the price of cars, and if they prove in practice to be as strong and durable as is believed by many, it is an economical plan of construction. This design is one that is worth the attention of those who have to pay for repairs to draft rigging, body bolsters and underframes. Its advantages are that it is simpler, stronger and more durable than any plan of wooden sill construction in use, that is if the calculation of the strength of the parts is to be taken as an indication of these things, and we think it is. The success of the Fox pressed steel underframes and the rolled steel underframes in Europe shows very clearly that there is a reduction in the cost of repairs when steel is substituted for wood in car-sill construction and that there is a saving of weight that is important. In the matter of wrecks it has been claimed that the steel sills will cost more to repair, but, as the cost of running repairs and draft attachment is many times that of the repairs to these parts resulting from wrecks, it appears that a small percentage of saving in the running repairs will more than offset an increase of 100 per cent. in the repairs from wrecks. It is reported that several railroad companies will try the steel center sills on a few of the next lots of freight cars purchased. Probably more than any other change, which has operated to further the introduction of steel center sills for freight cars, is



the recent important drop in the prices of steel channels. This has been shown in a very striking way by the *Iron Age* of Jan. 17, from which the diagram is taken. The reduction since 1888 is from \$74 to \$29 a ton.

The bill permitting railroads to sell to commercial travellers interchangeable 5,000-mile tickets, with privilege of carrying excess baggage free, has passed both houses of Congress, and this news "is received with much rejoicing by the Travellers' Protective Association." Every one else, however, should deplore the passage of such a law. It authorizes a reduction in rates to shippers on that feature of their business where railroad rates are already too low, or at any rate low enough, and complicates rate-making, where it ought to be simplified. Ostensibly the bill is very innocent, being permissive and not mandatory, but it gives the drummers one more weapon with which to attack the weak roads whenever the passenger men evince a disposition to keep rates stable. In other words, it affords a good-sized loop-hole for a rate-cutting traffic officer to crawl out of when his competitors catch him violating an agreement. In many cases sample trunks ought to pay more rather than less. They are unusually heavy, are generally extra valuable, come at inconvenient times, and are often accompanied by a passenger who likes to evade reasonable regulations. The reason for selling mileage tickets to any one at reduced rates has but slender basis in any sound principle, for the "wholesale" idea does not apply in any economic

sense; it has a much more rational application in party-rates, which the Interstate Commerce Commission tried to get abolished because such rates favored the wholesale buyer unduly. And the commercial traveller, with his troublesome baggage, certainly does not deserve the mileage ticket concession more than the average buyer of such tickets, but rather less. The only rational basis for a reduction on a drummer's baggage, or for anything more than a very slight reduction on his ticket, is in his real or alleged control of freight shipments, but that reduction ought to be made squarely on the freight rate. The passenger department has enough sins of its own to carry.

### The Law and Standing of Voting Trusts.

At the last session of the present Congress Mr. Straus of New York submitted a bill entitled "A bill to regulate railroad companies engaged in interstate commerce." In our issue of August, 1894, we gave a summary of this bill, and commented editorially upon its various provisions in general. This measure was referred to the Committee on Interstate and Foreign Commerce, but did not become a law. Public attention has again been drawn to it by its introduction anew. As the measure makes a new departure in railroad law, it deserves most careful consideration and discussion.

The feature of the bill which we shall now consider is that which prohibits "voting trusts and other arrangements"—to use the language of the bill—"devised to separate the ownership of shares from the right to vote thereon." Such "voting trusts and other arrangements" are declared illegal, and null and void, whether made apart or in pursuance of a scheme of reorganization, or otherwise originating. Inasmuch as any violation of the act is declared to be a misdemeanor, punishable by a fine of not less than \$5,000, or by imprisonment in the penitentiary not less than one year, or both, the opportunity to inquire into the propriety of such a measure should not pass unimproved.

A man from another world suddenly finding himself here in the midst of a Congressional discussion over so simple a thing as uniting with others in designating an agent to vote on one's stock, would naturally wonder why such a grievous punishment should be meted out therefor. Now, of course, all simple things are not harmless, but a great many of them are; and when a thing is both simple and convenient, as this proxy business is, one will have to look back a little to see how it has operated to understand Mr. Straus' great indignation at it. We shall therefore take a glance backward.

Back in 1882, when Mr. Jewett was President of the New York, Lake Erie & Western, it was agreed between him, his company and Messrs. Hooper and others, trustees, representing the holders of the majority of the stock of the Cincinnati, Hamilton & Dayton, that this stock should be registered in the name of Jewett, who was to deliver to the appointee of the directors of his company an irrevocable proxy to vote on the stock for directors at the elections of the C. H. & D. The certificates of the stock, however, were to remain in the hands of the trustees, who were to issue to the several owners "pool certificates" in amounts equal to the par value of their respective shares. The Erie agreed to guarantee to the owners a perpetual semi-annual dividend of 3 per cent.

Here was a voting trust of the most aggravated type. The ownership of the stock was forever to be separated from the power to vote on it. Those who were out of the combination had, indeed, the right to vote directly on their own stock in the corporate elections, but being in the minority, the right was barren. Their brethren who had surrendered their corporate birthright for a perpetual mess of pottage, were deaf to argument, and to reason blind. They could not be persuaded to inaugurate any improved policies for the corporation, because they had lost the right to do so forever. The only light those wandering stars could exhibit in the corporate firmament was a perpetual semi-annual dividend of 3 per cent. The property of the company might go to the dogs, for ought they could say, do, or care. The duties of the corporation to the State were equally matters of indifference, for these disembodied corporate spirits had neither hands nor feet adapted to corporate uses. The wails of the minority over the waning values of unpooled helpless stock fell unavailing upon heedless ears, and the frowns of State authorities bore no terrors to sightless eyes.

We think it must be apparent that upon such a state of facts as this a wrong was done both to the minority and to the State. Because where a corporation is formed each stockholder and his assigns



enter into an implied agreement with every other stockholder and his assigns not to become *functus officio* as such, during the corporate existence. He may sell his stock if he pleases; he may pledge it, lend it, or do anything else he chooses with it; but he cannot as long as he continues the owner of it, paralyze his corporate functions so as to render himself incapable to respond to his corporate obligation. It is not so much that he thereby harms himself, as that he harms his fellows and the State. Corporate suicide is no more to be approved than any other suicide, but great as the mischief may be upon oneself, the greatest mischief to be prevented is that upon the rights of others.

We thus see that the arrangement, in its very scope and essence, violated the fundamental understanding that all the stockholders had with each other and the State, at the origin of the corporate enterprise; that they had by this arrangement put themselves where they couldn't help themselves. They might or might not have been satisfied with the results. The effect may or may not have been advantageous and profitable to themselves. This is immaterial. The gist of their conduct was that it was a violation of a covenant upon which the whole corporate structure rested, and which could not be broken without dashing it to the ground.

But, says a repentant stockholder, the deed is done; the pact is made; I cannot help myself though I would. At this point the law should step in and pronounce any contract so harmful to the public welfare, void and unenforceable. And so we understand it does. Such was the actual decision, upon the facts noted of the Cincinnati Superior Court in 1885, in the Hafer case. The court also was of opinion that the N. Y., L. E. & W. had no capacity to enter into such an agreement and held it void for that reason also.

In the following year the same court had before it for construction the trust agreement of the stockholders of the Cincinnati, Hamilton & Dayton. The late Henry S. Ives and his associates attacked that agreement as being null and void under the Hafer decision. The trust recited that the object of the combination was to prevent the stock from being bought up for speculative control, to secure safe management and to guard against hasty consideration, sale or lease of the road. The subscribers to the trust agreed to convey the legal title of their stocks to the trustees, who were to issue certificates to the respective owners for the face value of their stock. The trustees were authorized to vote for and represent the stockholders, and this power was declared to be irrevocable during the existence of the trust, which was to continue five years. Mr. Griffith, one of the plaintiffs in the case, had become a purchaser of a number of these pool certificates, which on their face referred to the trust and specified that the holder had no right to vote at the meetings or elections of the company. The relief asked by him was that the trustees should be restrained from voting on the stock represented by his certificates, and that the stock be transferred on the books of the company to his name. The Court held that the right to vote is an incident of the ownership of the stock and cannot exist apart from it; that the owners of the trust certificates were the equitable owners of the stock represented by them, and being such the incidental right to vote thereon belongs to them; that they might permit the trustees to vote for them, if they chose, but when they elected to exercise the power themselves, they could not be prevented from doing so, notwithstanding the provision as to the irrevocable proxy. And so while the trust under view was held to be lawful, it was revocable, even before the expiration of the time set by its terms.

Aside from the intervention of the N. Y., L. E. & W., the differences between the arrangement in the Hafer case and the Griffith case are salient. First, as to duration. What Hafer complained of was a perpetuity. Griffith couldn't stand five years. Again, in the Hafer case the trustees practically divested themselves of their trust and turned it over to Jewett, who in his turn agreed to give the voting power forever to any appointee of the directors of his company. In the one case there was a limited grant for a lawful purpose; in the other a divestment forever for an unlawful purpose. In the one case the arrangement was lawful but revocable; in the other unlawful and without efficacy from the start.

Shortly after the Griffith case, that of Woodruff was decided, in 1887, by the Circuit Court of the United States in New York. Here the president and a committee of the directors of the Dubuque & Sioux City Railroad, wrote a letter to Drexel, Morgan & Co., requesting them to receive stock from the stockholders with power to transfer and to issue negotiable receipts for it, for the purpose of enabling the directors to dis-

pose of the property as they might think best; or to dispose of the stock deposited for the common benefit, or to execute a lease of the property, and to vote for such persons as directors at the coming election as they might think best—the conditions not to be binding, except as to sale of stock, until a majority of stock should be deposited. A majority was deposited and Woodruff was one of the depositors. Subsequently he withdrew his assent, and signified his intention of voting on his own stock. Whether he could do so was the principal question in the case. The Court held, that he remained the owner of the stock, in spite of the deposit, and the right to vote followed the ownership and could not be conveyed away separately. The effect of the arrangement was merely to authorize the depositors to vote on the stock during the pleasure of the owner and was accordingly lawful, but revocable.

In the same year Mr. Cornelius Vanderbilt brought an action in Pennsylvania to set aside the voting trust of the Pittsburg & Lake Erie. Here the power to vote was perpetual, and the mischief of that business was illustrated, for the trustees were found to be exercising the power against the interests of the beneficiaries. The Court held the arrangement to be illegal or in any event revocable.

In the Shepaug trust, the combination was to last five years, or until approved consolidation with some other company, or until dissolved by agreement of the members of the syndicate. The avowed purpose on the face of the agreement—to insure the completion of the line and unity of action to that end—was innocent and lawful. But the real object was to carry out a secret agreement for a construction contract promising great profit to the directors. The trust was annulled. Here, had the avowed purpose been the real purpose, and the trust in good faith established for a limited period, we apprehend the Court would have held it lawful enough, but revocable, where the only consideration in the agreement was the mutual promises of the parties to keep together.

Of course in some of the States there are special statutes on the general subject behind which the courts cannot go, and against which reason and good policy are alike unavailing; decisions in such States are eliminated from the discussion, and simply serve as illustrations of the good or bad effect of the local system, after a reasonable time has elapsed for the experiment to be tried.

We shall hereafter state the views we entertain as to the wisdom of legislation on the subject, but for the present commend the foregoing illustrations to the thoughtful consideration of the lawmakers.

#### The Norfolk & Western.

The fact that the Norfolk & Western has joined the great company of receivership roads is one of the many misfortunes which have overtaken us in the last two years, for its securities are largely held abroad, and its present difficulty will tend to still further discredit American investments in Europe; and certainly that result must be regarded as a national misfortune. Nevertheless, those who have watched carefully the condition of the railroads of the country for some months past were not surprised when the receivership of the Norfolk & Western was announced. The managers of the property have published annual reports in such detail that it has been possible for investors to judge of the development and condition of the property, and it has been widely known for a good while that the business of the company was being done on an extremely slim margin of profit, if, indeed, it yielded any profit.

In general terms we may say that the receivership is the result of a policy which might have been a successful one in prosperous times, but which was a very dangerous one, and almost sure to lead to failure in times of great depression. It is only just to say that this policy was begun in good times, and when no human mind could have foreseen present conditions. That policy has been to extend the system, and especially to build up a great mineral traffic. How successful this has been will appear from the following figures. In 1883 the coal carried amounted to 54,552 tons, the coke to 23,762, the iron ore and pig iron to 76,526 tons. The total mineral traffic in that year was 198,947 tons. The total freight carried in the same year amounted to 797,255 tons. In 1885 the coal and coke tonnage had risen to 547,709 tons, and the total mineral traffic was 685,271 tons, while the total tons of freight amounted to 1,199,790 tons. In 1893 the total tons of coal and coke amounted to 3,408,763; the iron ore and pig iron were 784,108 tons, and the total mineral traffic was 4,599,914; the total freight was 6,325,735 tons. That is, the coal and coke traffic in 1883 was 9 per cent. of the total tonnage, and the entire mineral traffic, including coal and coke, was 25 per cent. In 1885 the coal and coke business had risen to 45 per cent. of the total tonnage, and the

entire mineral traffic to 57 per cent. In 1893 the percentages were: coal and coke, 54 per cent.; all minerals, 73. The total passenger earnings in 1893 were \$2,044,852, and the freight earnings \$7,987,766; that is, the freight earnings were nearly 80 per cent. of the whole.

Under such conditions, when the freight earnings are so large a percentage of the gross revenue, and when of these 73 per cent. is from minerals, being mostly coal and iron, the revenues were bound to suffer severely in a time of great industrial depression. It is true that last spring and summer, while the great coal strike was on, the Norfolk & Western did an immense business; the miners in the region which it serves being very largely negroes, did not go out. But the rates per ton-mile had fallen to a very low figure, indeed, as a result of the policy of creating a vast coal traffic in competition with strong and well established trade. The coal fields reached by the Norfolk & Western are very fine; the seams are thick and the quality of coal excellent. But the haul to market is longer than from the fields reached by competing companies, where the other conditions are nearly, and in some cases quite as good. The result has been a steady fall in rates. The annual reports do not give us the ton-mile rate on coal and coke apart from the general freight rate, but the rate received per ton per mile on all freight in 1893 was only 0.514 cent, and the estimated profit per ton per mile is 0.152 cent. In 1885 the rate per ton-mile was 0.741 cent, and the estimated profit 0.298. We do not attach much value to the figure given for the profit per ton per mile, as we question very much the practicability of making an accurate estimate of the portion of the total cost of operation to be charged up to the cost of hauling a ton a mile. But it is obvious enough that at a little over five mills a ton a mile conditions must be extremely favorable to yield any profit at all. As a matter of fact, the Secretary of the Company himself states that for the past two years the net earnings have not been enough to pay fixed charges, and this, we suppose, tells pretty much the whole story. The coal trade has been built up, and the railroad company has paid the bills.

There is no doubt that the property is an excellent one, and we believe it is true that its tracks and equipment are in fine condition, generally speaking. Of course, much of it is new, and this part of the management of the property has been in the hands of superior men. Of the mineral wealth of the region served by the system, there is no question whatever. It is reasonable to suppose, therefore, that a reorganization can be effected which will yield to the owners of the securities a large salvage.

#### The Advantages of Large Grates.

Mr. Barr in a recent discussion at the Western Railway Club raised an interesting point about the French boiler tests lately published in these pages when he inquired if the increase of the grate could go on indefinitely and continue to carry with it an increased efficiency? The experimenters who made the tests did not draw such a conclusion, principally for the reason that only one size of grate was tried.

The only ground for the statement that an increase of grate area will give better efficiency is found in the fact that better economy was had when less coal was burned per square foot of grate per hour. It is a fact that the less the draft, within quite wide limits, the greater will be the efficiency, as is the case with all boilers when forced as much as locomotives are in this country. It must now be found why it is that an increase of draft decreases the efficiency. Is it because the hot gases are hurried through the tubes, and thus less of the heat which those gases contain is given off to the water? Or is it that the greater velocity of the air through the grates prevents a proper mixing with the gases and thus gives less complete combustion, while at the same time more unconsumed fuel, in the shape of cinder, is carried to the smokebox?

No doubt it is to both these actions that the less efficiency is due. There is considerable waste in a locomotive boiler by the gases and cinders passing to the smokebox at a high temperature, and when the blast is less this loss is reduced. It is clear that the reduced draft does, of itself, give an increased efficiency, and with any given boiler if the draft can be reduced there will be a saving. But with any well arranged locomotive boiler such a reduction is practically impossible, for if the exhaust apparatus has been arranged as it should be then the blast is no greater than that necessary to blow the fires. It is true, as was said recently in one of the reports to the International Railroad Congress, see *Railroad Gazette* Jan. 11, p. 17,



that a saving can be had from the intelligent use of a variable exhaust nozzle and that the best results are obtained when the maximum blast that is permitted by such a nozzle is only that which is just necessary for the most extreme service which the locomotive has to perform. This saving comes from the fact that the draft can be made less when a heavy draft is not necessary, while with the common fixed blast-pipe there is often more draft than is necessary, and there is no way to reduce it.

To get the saving that can be had from reducing the blast on any given boiler, already built, two things appear to be necessary. First, to put on a variable exhaust that has not too high a limit of action, and only enough to enable the locomotive to do its maximum work. Second, to induce the engineers and firemen to use it with intelligence. Probably this last is the harder thing to do, and will be until it becomes an advantage to the men to save fuel.

In starting out with a new design more can be done. It is not wholly the draft in the smokebox that affects the efficiency, as that does not determine the velocity of the gases through the tubes. It is the velocity that determines the time that the gas is in the tubes and during which the absorption of the heat goes on. The velocity is dependent upon the friction of the gas in the tubes and upon the density of the fire. With a thin fire and a low draft there may be a high velocity, while with a thick fire and a heavy draft there may be but a low velocity; thus it is in the hands of the firemen to determine largely what shall be the loss due to a high velocity of gas through the tubes. But in starting out with a new design of locomotive, the size of the tubes can be varied to advantage, and sometimes a three-inch tube is better for certain classes of work and for some fuels than the more common two-inch tube. The longer the tubes the larger they can be in diameter with the same efficiency, and the larger they are the less is the blast that is necessary to get a given pull on the fires. But when the tubes are not more than ten feet long it is not probable that an increase of the size of the tubes above two inches will reduce the necessary draft any material amount nor will it increase the efficiency. For much longer tubes, say fourteen feet, it is not known what would be the effect of an increase of diameter. A good many engines have been built with tubes of that length and three inches in diameter, but no accurate tests have been recorded to show the value of those dimensions. Unfortunately we reach the limit of the recorded useful knowledge very quickly in this direction of search.

It is now seen that the strength of the blast does, of itself, affect the efficiency of the locomotive boiler independently of the rate of combustion on the grate, but no one knows to what extent. The effect is confined mostly to the change in the velocity of the gases through the tubes and cannot be so important as the results of incomplete combustion and an imperfect mixing of the gases from the fuel with the incoming air. To test this point the rate of combustion would have to be kept constant per square foot of grate, and the velocity of gases through the tubes increased, either by decreasing the number of tubes or by increasing the blast and increasing the grate area to keep the rate of combustion constant. This would be a hard experiment to make in such a way that one would feel that the results were to be relied on, and for conclusions of value it is better to get a practical trial of the large and small grate under otherwise equal conditions and learn from that whether the rate of combustion per square foot of grate does of itself very largely determine the efficiency of any boiler when the firing is as much forced as it is with locomotive boilers. This is the question before the Western Railway Club.

There must be a large amount of good practical evidence already gathered on this point, for boilers with large grates have been replacing those with small grates on a good many lines within the past few years. All the tests that have been accurately made have shown that when there is a decreased rate of combustion on the grate of a locomotive there is a gain in economy when the grate is properly covered, and those who are experienced in the comparative tests of simple and compound locomotives are always chary of conclusions as to the value of the compound feature that are based on the fuel efficiencies when the grates are of different sizes. In such cases the sole reliance is placed on the water used per ton-mile or per horse-power per hour.

So far as the experience with forced draft in marine work is of value to throw light upon this

point the evidence all shows that an increased efficiency may be expected from a decreased rate of combustion on the grate of a locomotive. The same may be said of all stationary boiler practice in which the forcing has been carried to a point that is comparable. Up to a few years ago the rate of combustion on the grates of stationary boilers was not as high as it is now and there appears to have been some loss in the fires themselves from a too low rate of combustion, but with plain cylindrical shells there could not be much draft or the gases would pass to the chimney too hot. With the introduction of the tubular boilers and the water tubes the heat was more quickly taken from the gases and the draft was increased, and this increased the rate of combustion per square foot of grate from about 12 pounds per hour to 20 and 25, with an apparent saving. This is the limit to which the increase has gone in stationary practice, while in locomotives 200 pounds has been reached in some cases and it is not uncommon to use 150 pounds. European practice averages for locomotives only about 40 or 50 pounds, and European locomotive boilers are more efficient than the American solely for that reason.

To get good and complete combustion the temperature of the fire must be high enough and there must be a sufficient air supply. Of equal importance is the mixing of the air and gases so as to permit nearly complete combustion. In all cases many times as much air as is necessary to burn the fuel is forced into the fire through the grate so as to be sure and give to each particle of the gas its quota of air. If this is not done the gases go to the chimney unburned, as there is not time to permit a complete mixing, and the gases must therefore be fairly flooded with air. This flooding, called "dilution," has to be increased as the rate of combustion is increased, as there is then less time for the gases to mix. If the air is first heated to a high temperature the dilution can be somewhat less, and if there is a considerable distance from the fire to the tubes, where the flame is extinguished, the dilution can also be less, and this last is the argument that is offered in favor of the deep firebox. A large locomotive grate cannot be had unless the fire-box is placed above the frames, and perhaps above the wheels or back of them.

All agree that what is wanted is not only a large grate but a deep firebox as well, so as to get a long flamework. But it is impossible to get both, and the present argument is on the question which is best.

It is beyond dispute that a large grate will burn a lower grade of fuel than a small grate, and that, of itself, is some evidence that there is a better efficiency with a large grate, no matter what the fuel. The experience with the large grate in this country, especially the Wootten, has been considerable and we do not know of a single instance where a road has made a fair trial of the large grate above the frames and has returned to the deep box again. All who are using the large grate on enough locomotives so that the firemen are experienced and are satisfied to fire such grates are pronounced in favor of them so far as we know. On the other hand, those who have a few large-grate engines, and firemen who are accustomed to the small grates are frequently heard to say that the large grate is a failure. Now a small grate is easily fired, but with large grates firemen have got to use judgment and think; at first this comes hard, but when they get accustomed to the large grates the work goes on as smoothly as ever.

Not long ago an important Western road built a large-grate engine at its own shops, and with a good fireman, who knew what he was expected to do with that particular engine, she was a success and gave a good saving. But when the road got a lot of them all in a bunch trouble commenced. The engines would not steam and the men did not want them. This made things look black for the mechanical engineer and he grew desperate, with the result that a traveling fireman was put on and the men were told that they would have to make the engines steam if the expert could, and they did, and instead of carrying from 12 to 28 inches of fire on the grates the thickness was reduced to six or eight inches, the engines steamed well, and are the standards of the road to-day and give an increased efficiency over the small-grate engines of 20 per cent.

In another case an engine with an 11-foot grate, above the frames, was put on to a road where there had been only deep fireboxes and small grates before. The fireman was a small man and could not handle such a fire and it made him tired, and he called for another fireman to help him. The master

mechanic condemned the locomotive. To-day that engine is one of the best on the road, the grate has been shortened a little with fire brick and the fireman has learned how to fire a large grate.

This is the class of trouble that is met when a change is made from small to large grates, and it is not surprising that we should hear that limited trials are failures, while those who are using the large grate on many engines and thus have a chance to make comparisons show that the small grate is far less economical.

The next important step to increase the efficiency of high-speed locomotives must be in the increase of the grate area if the trains are to be kept as large as they are now. With the increase of grate will come an increase of heating surface, and that will be quite as important.

#### The Bond Market for January.

Events of importance in the bond market followed one another in quick succession during January. The first 10 days were unmarked by any unusual occurrence. Soon thereafter it became apparent that the heavy withdrawals of gold from the Treasury, both for export and for deposit in banks and trust companies, would force the government to take measures for protection. The total withdrawal during January was \$43,400,000, of which amount \$25,250,000 was exported, and the reserve was reduced to \$42,300,000 at the close of the month. The condition of the Treasury gave rise to the talk of an issue of bonds, followed by a fall in exchange, and a decline in the price of other governments, as well as high-class railroad and industrial securities. The movement in governments during January recorded the following net losses: Registered 4s, 1½; coupon 4s, ¾; registered 5s, 1½; coupon 5s, 1½. Since the close of the month the depreciation has been even greater in some of the issues. For example, the coupon 4s which touched 112½ Jan. 30 are now bid 110. This decline seems to have discounted, in a degree at least, the sale of the new governments. President Cleveland announced last Friday that arrangements had been made for the purchase of 3,500,000 ounces of gold at \$17.905 with 30-year 4 per cent. bonds. The value of the gold is \$18.605. The difference of 80 cents per ounce, or \$2,800,000, represents the premium. It is figured that the bonds are sold at 104.495 and will yield 3½ per cent. At least one-half of the bonds are to be sold abroad and in such a way that the purchasers will not directly or indirectly draw from the government the gold paid therefor. The high yield of interest has been the factor in connection with the issue that has caused the greatest adverse comment. The yield on governments outstanding is about 3 per cent. This is the case, for example, with the 4s of 1907 now selling at 110. If the new 30-year 4s were to be advanced so as to sell on a 3 per cent. basis their price would be 120 against the purchase figure of 104.495. Thus, it will be seen that if the syndicate advances its holdings to a price anywhere near that current on outstanding issues, the profit will be enormous. On the other hand, if the new bonds do not advance, the tendency of the old ones will be downward. This would naturally weaken the prices of all investment securities based upon governments as a standard. But so long as our cowardly Congress insists on using the word coin instead of gold in the bonds there is no help for this situation. These factors and probabilities have been directly reflected in the security market. There was a steady selling of the first class of railroad bonds, a movement which extended to the second class and speculative issues and resulted in average declines of every group, except that comprising the Southern roads.

The fear of a premium on gold as a result of the heavy gold withdrawals rendered the gold bonds the more desirable, minimizing the sales, and having the effect of steadying the list. The general unsettled condition of finances caused a number of holders to take profits which had accrued in the rise of two or three months, or as the case might be, to close out their holding with a view of buying them back at a lower price later on. The movement of the various groups was as follows:

|                                      |        |
|--------------------------------------|--------|
| Receivership group declined.....     | \$1.96 |
| Granger group declined.....          | .36    |
| Trunk line group declined.....       | .41    |
| Southwestern group declined.....     | .55    |
| Transcontinental group declined..... | .33    |
| Coalers group declined.....          | .56    |
| Southern group advanced.....         | .12    |
| Miscellaneous group declined.....    | .76    |
| Combined list declined.....          | \$0.60 |

The heaviest decline was in the issue of receivership roads, and the various prices were very irregular. The reorganization movement during January in a number of notable instances showed retrogression and in others was nil. The delay of Congress in acting upon the Reilly Funding bill of Union Pacific, the preparations of the first mortgage for foreclosure, and lastly the hopeless defeat of the measure, combined to render all the issues of that system very weak, and the low-priced ones, those which would of necessity suffer severely through a disintegration of the system—to lose heavily in values. The demoralized condition of the coal trade and the inability of the committee having the matter in charge to cope with the situation, postponing indefinitely all hope of Reading's reorganization, was reflected in sharp declines in its securities. The situation was the cause of the liquidation of a number of important holdings which was followed



by a general selling both for long and short account. The general mortgage 4s which up to this time stood up remarkably well on the idea that any foreclosure would favor them, lost some seven points. The average loss of the various bonds was nearly four points. The total sales were \$1,434,000 par value.

Another group much weaker than the average was Northern Pacific. The junior securities were especially depressed under heavy liquidation by both foreign and domestic owners. The report that Mr. Henry Villard contemplates returning to the United States in the spring for the purpose of effecting a reorganization of the system was the cause of considerable selling. This response by stockholders to the intelligence was a silent but eloquent commentary upon Mr. Villard and his methods. The various issues of the group recorded an average loss of over 2½ points. The sales of the consolidated 5s, which lost 2 points, were \$432,000, par value. Atchison issues were without special feature. This is probably due to the stationary condition of the reorganization. The 4s have grown to be the leaders in speculation, while the 2ds came in for a share of attention of a similar nature. The former advanced 1 per cent. on sales, par value, of \$1,824,000, and the 2ds were unchanged on sales of \$525,000. Erie issues recorded losses on bad earnings. Other bonds of the receivership roads, with a few exceptions, declined in sympathy with the general market.

The Granger group reflects more exactly than any of the others, except perhaps the Trunk lines, the currency condition. The advance of the early part of the month offset in a measure the decline which occurred later. The most striking and characteristic feature was the strength of gold bonds against those containing no gold clause. As a rule they advanced, thus keeping up the average. There was no individual movements of especial note.

What has been said of the Granger bonds applies to those of the Trunk lines. The greatest advance was scored by Michigan Central 5s, which was 3 per cent. The greatest loss was in New York Central 1st 7s, being 2½ per cent. All of these issues show material increase in price as compared with a few months ago.

The Southwestern group displayed its customary activity. The issues are largely speculative in their nature, and in a stock market such as we have had during January, they were naturally susceptible to speculative conditions. This is why Kansas and Texas 4s were very heavily dealt in, as were also the 2ds, the sales in each aggregating over \$700,000. The fluctuation was within a comparatively narrow range. Texas Pacific 2ds and 1sts were also active and weak, reflecting realizing. The 1sts on sales of \$333,000 par value, and the 2ds on sales of \$638,000 par value, lost each 2½ per cent. More stability was shown by Wabash issues.

The Coalers were irregular. Heavy losses were scored by Lehigh & Wilkesbarre associated bonds, and Lehigh Valley 4½s, being 3 and 1½ respectively. Advances were in New York Ontario & Western 4s and Susquehanna 5s on improved prospect for those companies outside of the coal trade. These kept up the average of the group. All attempts thus far made to correct the demoralization in the coal trade have proved futile. A committee has been working some two months on a basis of operation, and held a meeting on Feb. 5. It was unattended by results. Meanwhile prices are growing more and more demoralized, and some of the leading interests assume a threatening attitude in the matter of freight rates. The feature of the Southern group was the pronounced activity in Southern railway 5s. There was heavy liquidation in the bonds started out by the closing out of one or two estates. It was continued by frightened holders. Bonds to the amount of \$1,311,000 par value were sold. The net loss was 2½ per cent. The strong issues of the group were Louisville & Nashville bonds which reflected the progressive steps taken by the management in its book-keeping, whereby it now charges improvement expenditure to earnings.

The miscellaneous group was exceedingly irregular, being affected by speculative conditions and specific causes. The change in the management of the Chicago Gas Company to the control of the Standard Oil interest, advanced Chicago Gas Light & Coke 5s 1½. The decline in Green Bay 1sts of six points is due to the fact that six months has elapsed since default, despite which fact the management has not announced a plan providing the interest. Brooklyn Elevated 1sts were strong on the trolley strike, which diverted earnings to that system. The banner decline of the month was in United States Cordage 1sts which dropped 12 points to 51 and 52 on poor business, sinister rumors concerning the credit of the company, and the feeling of a gloomy outlook for the ensuing year.

The following table gives the volume of rates, par value of active bonds during January:

|                                 |             |
|---------------------------------|-------------|
| Atchison 4s.....                | \$1,824,000 |
| Atchison 2nds.....              | 525,000     |
| Ches. & Ohio gen. 4½s.....      | 356,000     |
| Kansas & Texas 4s.....          | 712,000     |
| Kansas & Texas 2ds.....         | 744,000     |
| Northern Pacific con. 5s.....   | 432,000     |
| Oregon Short Line 6s.....       | 385,000     |
| Rock Island ext. 5s.....        | 400,000     |
| Reading gen. 4s.....            | 347,000     |
| Reading 1st incomes.....        | 415,000     |
| Reading 2d incomes.....         | 318,000     |
| Reading 3d incomes.....         | 454,000     |
| St. Louis Southwestern 1st..... | 426,000     |
| Southern Railway 5s.....        | 1,311,000   |
| Texas & Pacific 1sts.....       | 333,000     |
| Texas & Pacific 2ds.....        | 638,000     |
| Wabash 1sts.....                | 341,000     |
| Wabash 2ds.....                 | 339,000     |
| West Shore 4s.....              | 468,000     |

### Proposed Legislation.

The legislative mills begin to show signs of slackening. In some States the limit of time for introducing new bills has already expired and in others this happy time will soon come, or, let us hope, the members will have to stop to catch their breath. Reports of adverse action by committees begin to come in, though as yet we have seen only a few. Supplementing the statement printed Feb. 1 we note a few of the more prominent railroad measures in the several States.

**Commissioners.**—In Arkansas, where a fortnight ago the reporters found "a decided paucity of railroad bills," there is now a full-fledged scheme for a railroad commission, but what its prospects are we do not know. In Massachusetts a member who desires to cut down expenses proposes that the railroad commission shall have one member instead of three; in Wisconsin it is proposed to have three members instead of one.

**Employees.**—A "friend of labor" in Massachusetts wants to have 10 hours of work within 11 consecutive hours made a day's labor. In Kansas a law is proposed to prohibit the employment of inexperienced conductors and engineers. In Illinois, committees of railroad brotherhoods are at the Capital, working for the passage of a number of bills of the usual kind intended to help "labor."

**Rates, Passenger.**—In the State of Washington there is a bill for regulating railroad affairs generally, including rates. In several States there are propositions of this kind which are too vague to specify, but which have the same general aim. Many of these and other railroad bills look as if the originators of them in one State sent them around to the law makers in other States, and the country "statesmen" seem to be fully up to date, presenting all the latest fads. The man in New York who proposes to reduce passenger fares took occasion to insert in his bill a provision requiring all tickets to be unlimited. Evidently the abolition of stop-overs on the New York Central has hurt some one's feelings. Sleeping-car regulation is on the docket in Arkansas, Illinois and Nebraska and, we doubt not, in a dozen other States whose records we have not carefully searched. If some thrifty legislators fail to get Pullman passes the coming year it will not be for lack of a concerted movement.

Among the more distinctly humorous propositions is one in Minnesota forbidding sleeping-car porters to receive tips. Another is that presented in New York to permit a workman to carry his tools into a passenger car with him, provided they do not weigh over 35 lbs. This must include sleeping cars, of course, but whether a hod-carrier will be allowed to demand that the upper berth be left closed, so that he can stand erect with his hod upon his shoulder, is left unsettled. It seems to us that the upper-berth law and the hod-carrier law ought to be combined in some way. Senator Ringdal, of Minnesota, presented a bill empowering a committee (his committee) to find out how much water there might be in railroad stock, what is the value of the companies' rights of way, and other practical questions, but the committee in the most unfeeling manner appointed Mr. Ringdal himself as a special committee of one to go and get the information. We venture to say it will not be forthcoming in any great volume. A lawmaker in Pennsylvania proposes that passengers in street cars who cannot get seats shall be carried for one cent less than those who sit down. The equivalent for exchanging a seat for a standing berth has generally been a woman's smile, but whether the author of this bill admits that he places such a low financial estimate on a feminine smile does not appear.

We read in a Cincinnati paper that "Mr. George H. Daniels, general passenger agent of the New York Central Railroad, finds time to engage in something else besides railroading. He is just now fighting for the preservation of the Palisades of the Hudson which are being destroyed by quarrymen for street paving and other material. The entire press of the country is urged to take up the crusade against the vandals who are destroying some of the Hudson's most famous scenery." This is all right, except that Brother Daniels has not in the least relaxed his grip on railroading. If our Cincinnati friend takes a second look he will probably find the New York Central water mark in the paper on which the appeal for the Palisades is written. As a good citizen of New York Mr. Daniels no doubt desires to have all our scenery duly protected, but he is not so narrow minded as to ask his Western editorial friends to aid him in a merely local scheme such as that idea would suggest. He is unselfishly working to promote the pleasure of the passengers between New York and the West, of whom the New York Central carries 38 per cent., more or less. To increase that percentage to 48, or 58, or 98, it will be necessary to see that the Palisades do not tip over and that the Hudson River does not dry up. There is another railroad man lending a hand outside the strict right-of-way limits of his road, though we have not heard his name. It is some one on the Lehigh Valley, which company, according to a Philadelphia paper, intends stocking the trout streams of Bradford, Sullivan and Wyoming counties, of which there are many, also all streams emptying into the Susquehanna, with black bass and other fish. Children and Philadelphians tell the whole truth, and this statement adds that "this will draw sportsmen from the large cities and give business to the Lehigh Valley." When the socialists come to draw up a railroad charter confining the corporations strictly to carrying persons and

property, they will have to put in a good many excluding clauses.

No better evidence of the serious condition of the anthracite coal trade can be furnished than the fact that prices continue to decline despite the cold weather throughout the country and the limited production. Prices instead of responding to the favorable conditions continue weak, indicating a pressure of tonnage. Much of the coal now being sold is designated as stock coal. This seems to throw some light upon the methods of the companies in handling their surplus tonnage. Unable to dispose of their output in preceding months they piled it at expense for handling, rehandling and deterioration. A good grade of stove coal is now selling at \$3 per ton, on a basis of stove, while new coal is selling at \$3.15 to \$3.40. This is against a nominal net circular of \$3.60 and is \$1.00 per ton less than the net prices actually realized last year in February. The low selling prices necessitate low freights. It is probable that the average price of the prepared sizes is considerably under \$3.00. Even at that figure the freight is \$1.20 per ton against \$1.50 or more a year. The committee having in charge the formulation of an agreement for 1895 is still at work. It has accepted a set of statistics carefully compiled by a sub-committee, and has taken the data under consideration. It is understood that the percentages of each of the companies is figured out in six different ways. Certain interests are given an increase at the expense of the others, and those which suffer still stand out. Without an unanimous agreement no plan can become operative—hence the painful delay.

In a preceding article we give further notes of some of the great variety of schemes to regulate railroads that are springing up in various State legislatures, faster than mushrooms. Many of these, perhaps most, are not worth the paper that they are written upon, but now and then one is worth notice as a good candidate for the humorous column. Mr. Blackshaw, of New Jersey, for instance, has proposed a bill providing that no locomotive shall cross any street at grade in Jersey City at a rate greater than six miles an hour; that there shall be at least three minutes intervening between trains crossing streets at grade, and no train shall block a street for more than a minute. A moment's calculation will show that this provision, if made into law, would limit the length of all trains to 528 ft. A train running at six miles an hour would travel only that distance in one minute. If a train contained more than ten 53-ft. cars the eleventh car would, we presume, be ground to atoms beneath the wheels of the trolley car waiting impatiently to cross. In Brooklyn, N. Y., where, according to the New York papers, every electric car is a juggernaut, and has been acting in that capacity for the last year or two, the eleventh car would be an especially dangerous vehicle to ride in or upon. Again, as two crossings would delay a train practically two minutes, a road afflicted with that number of crossings would be limited to 6,300 lineal feet of cars an hour, or, say, 180 cars each 35 ft. long. And if the eastbound trains could not manage to start over the crossing at precisely the same moment with a westbound, the number of cars that it would be possible to move would be reduced perhaps one half. It is plain that when Mr. Blackshaw becomes boss of Jersey City the railroads will have to put up—their tracks.

Here is a Massachusetts bill which makes one dizzy to read, the word "station" is compelled to do such hard work for the purpose of generalizing the very narrow and specific object of the bill. The proposer is Mr. Durant, and he desires "that passenger tickets entitling the holder to transportation to any station, including mileage tickets, shall be received for transportation beyond such station upon any train which passes by, but does not stop at such stations, when tendered in connection with mileage or other ticket, which would entitle such passenger to transportation from such station to a station at which such train does stop." Judging from other reports in Boston papers the aim of this bill is to get around the Boston & Albany's zone rates. A passenger going from Boston to Riverside, 11 miles, may get a low-priced 100-ride ticket, but to Wellesley, a mile or two farther, the zone regulations do not extend. The people of the latter town want to use the cheap ticket as far as it will go and then hand over a mileage ticket for the rest of the way.

Senator Dumbauld, of Kansas, is another lawmaker anxious to show his technical skill in managing details. He believes that the 150 wisest men of his State can profitably spend their time in considering the desirability of a law to regulate such a broad and fundamental question of railroad transportation as that involved in his proposition "to compel railroads to issue passes to shippers of fruit or vegetables, the pass to read to the destination of the car and back again." Probably a reduction of 90 per cent. in the freight rate would not afford half as much satisfaction as the possession of the pass, written on an engraved card and made out "account 2 cars cabbages." But why not an annual pass while you are about it? And why not provide on the return portion for the buyer who is coming out after the next car? Senator Dumbauld must be a beginner at railroad legislation.

The editor of the department of railroading in the *Engineering Magazine* for January has made a discovery that not only explains satisfactorily a curious instance of rail corrosion, but leads us to believe that the extrava-



gant policy of using tin tie plates is perhaps one reason for recent unsatisfactory returns on the stock of the Lehigh Valley Railroad. The editor reprints the little article on the corrosion of rails in the Musconetcong tunnel on the Lehigh Valley, published by us Nov. 23, and suggests that there may be an acid gas issuing from the rock which makes the water in the tunnel a very active reagent. Then he says, "is it not also possible that, as a part of the rail rests on a tin plate, a certain amount of galvanic action is set up throughout the entire length of the rail?" We observe with keen gratification this new instance of how problems, otherwise difficult, are rendered simple by electrical science. Doubtless tin tie plates might induce galvanic action, all conditions being favorable, as indeed might nickel-plated spikes, for that matter, and we should not advise the use of either. But if they are used why not insulate the tin plates with cut glass insulators?

## TECHNICAL.

### Manufacturing and Business.

The Locomotive Valve Gear Mfg. Co., of East St. Louis, capital stock, \$500,000, has been incorporated in Illinois. The incorporators are H. M. Metcalf, Eugene Parrish, G. B. Carstarphen and D. J. Timlin.

The Shelby Steel Tool Co., of Shelby, O., is now employing about 300 men at its works at Shelby. Important orders are on hand and the shops have been working day and night for some time to keep up with the orders.

Harrington, Robinson & Co., New England agents for the Wharton Railroad Switch Co.'s switches, frogs and switch stands, have removed their offices from 10 Oliver street to the Telephone Building, 125 Milk street, Boston.

The five passenger and 10 freight locomotives recently ordered by the Lehigh Valley from the Baldwin Locomotive Works are to be equipped with the Fuller steel tired wheel made by McKee, Fuller & Co., of Catasauqua, Pa.

The Central Iron Works, of Harrisburg, Pa., have secured a large order from the A. & P. Roberts Co., of Philadelphia, for steel plates to be used in the construction of the Blackwell's Island Bridge in New York City. The order will keep the plant in operation for over a year.

The American Steel Co.'s works at Thurlow, Pa., are very busy, and an additional force will be needed to keep up with the orders. One of the largest castings ever made there was the bed of the gun carriage cast on Monday of last week. Its weight is 28,000 lbs., and it is for the Cramps. The plants at Norristown and Sharon, Pa., have also been placed in operation.

At the annual meeting of the Bushnell Mfg. Co. held at Odenweldertown, Pa., on Feb. 4, E. L. Bushnell, of Poughkeepsie, N. Y., and E. M. Bushnell and H. S. Cavanaugh, of Easton, Pa., were elected directors. E. L. Bushnell was elected President and E. M. Bushnell, Secretary and Treasurer. The company has orders for car seats for 90 cars for the Northern Pacific and the Cleveland, Akron & Columbus.

Receivers for the Hicks Stock Car Co. have been appointed in West Virginia and in Illinois by United States Judges Jackson and Jenkins. The petition for a receiver was filed by R. J. Whitney, a stockholder, and other petitions have been filed by the Railroad Equipment Co. of New York, lessors of 2,300 cars to the stock car company and also by the assignee of the Terre Haute Car & Manufacturing Co., which holds leases for 780 cars. H. A. V. Post and Thomas Carmichael, of New York City, were appointed receivers in West Virginia. Judge Jenkins, however, restricted their authority in his jurisdiction to the rolling stock of the company.

### Iron and Steel.

The Ohio Steel Co. rolled its first steel at Youngstown, O., on Feb. 6, running the department about six hours, and turning out a fine quality. The machinery is running smoothly and the company expects in a short time to be an active competitor in steel making.

The Reading Iron Co. will erect a large puddle and rolling mill in the northern city limits of Reading, Pa., adjoining its Keystone Furnaces. Part of the machinery has been in course of construction for several months. The new rolling mill is to be 200x200 ft. and the puddle mill, 100x230 ft. It is rumored that a steel mill may be erected later on.

Proposals for furnishing steel to be used in the construction of the Northwestern elevated railroad, Chicago, have been submitted by the following companies: American Railway Construction Co., Chicago; Union Bridge Co., New York; Edgemoor Bridge Co., Edgemoor, Del.; King Bridge Co., Cleveland; Pittsburg Bridge Co., Pittsburg; A. & P. Roberts Co., Philadelphia, Pa.; American Bridge Co., Chicago; Phoenix Bridge Co., Phoenixville, Pa.; New Jersey Steel & Iron Co., and the Carnegie Steel Co., of Pittsburg.

The Court of Common Pleas at Pittsburg, on application of stockholders and creditors, has appointed Henry Warner Receiver of the Linden Steel Co. The company's statements show assets valued at \$685,000 and liabilities of \$485,000.

The large iron and steel plant at Greensboro, N. C., which has begun several years ago by the stockholders of the Cape Fear & Yadkin Valley railroad, and recently bought by Hon. Chauncey F. Black, of Pennsylvania, and Baltimore and North Carolina associates, will be started up for the first time this week. The ore will be furnished

by neighboring mines and Gov. Black thinks it will be a success from the start.

### New Stations and Shops.

The Missouri Kansas & Texas is erecting a 40-stall round-house at Denison, Tex.

The Berlin Iron Bridge Co., has finished the new gas house for the Bay State Gas Co., at Boston. The building is 51 ft. x 146 ft., with iron floor, iron roof trusses, iron purlins covered with slate.

A new station is to be constructed at Danbury, Conn., by the New York, New Haven & Hartford.

### Interlocking.

The National Switch & Signal Co., Easton, Pa., has recently received an order for interlocking the crossing of the Indiana, Illinois & Iowa with the Wabash road at North Liberty, Ind. The machine will consist of 24 working levers operating ten switches, five F. P. locks and 15 signals.

### Coal Car Sides.

The Master Car Builders' Association Committee on Coal Car Sides sends out the following circular.

Your committee requests a blue print of your latest design of coal car body, showing in detail the method of bracing the sides, and replies to the following questions: 1. How many cars with sides of this design have you? 2. When were the first of your cars with sides of this design placed in service? 3. What weaknesses, if any, have these sides developed in service? 4. At the present time, do you know of any other design of sides that you consider superior to this one? If so, please send print of it, if possible. Any further information that you may be able to give on the subject will be appreciated by the committee. Please address your reply and send blue print to R. E. Marshall, Chairman, Broad Street Station, Philadelphia, Pa.

### The Accident to La Gascogne.

The accident which delayed the steamship La Gascogne of the French line during her recent passage was less extraordinary than those which happened to the Umbria and the Paris, but was interesting. On the third day out from Havre the piston of the second intermediate cylinder broke, which necessitated the isolation of one pair of cylinders. The vessel then proceeded at a reduced speed of 11 knots. The engines of La Gascogne were built at Ste. Nazarre, France, in 1894. They are of the quadruple expansion type with six cylinders, connected in pairs in tandem. After cutting out the central pair of cylinders, consisting of a first intermediate cylinder using 87 lbs. pressure and a second intermediate using 40 lbs. pressure, there remained a high and low pressure tandem and an intermediate and low pressure tandem. These were used as a triple expansion engine.

Later on the crank bearings became heated, and speed was reduced to nine knots. It was then decided to replace these bearings with a new set, which took 40 hours. The greater part of the delay was caused by the inability of the vessel at reduced speed to make headway against the severe storms encountered. Repairs will be made at once, and the vessel will sail for Havre next Wednesday.

### The M. C. B. Standards.

The Secretary of the Master Car Builders' Association has issued the following circular:

At a meeting of the American Railway Association, held on Oct. 17, 1894, the following resolution was adopted: "Resolved, That the 'Details of Car Construction,' adopted by the Master Car Builders' Association, as published with the proceedings of its convention, held at Saratoga in June, 1894, be and are hereby adopted as standard by the American Railway Association, and all railway companies and car builders are recommended to conform thereto as soon as practicable." In accordance with the instruction of the association last June, the Executive Committee took up the question of standards with the American Railway Association, and the result has been as above. Members are urged to consider the importance of following this matter up and taking up the standards of the association with the proper officers of their respective companies and advocate their general adoption.

This refers only to the standards of details of car construction and not to the Rules of Interchange.

## THE SCRAP HEAP.

### Notes.

A San Francisco dispatch of Feb. 10, reports that the locomotive engineers of the Southern Pacific will not strike. Mr. Arthur, who was in San Francisco about a week, has started for home.

The Union passenger station in St. Joseph, Mo., was burned on the night of Feb. 9, the loss being about \$400,000. The building was erected in 1882. It was about 50x400 ft., and there was a hotel in the upper stories.

The "Knickerbocker special" of the Cleveland, Cincinnati, Chicago & St. Louis, which runs from St. Louis to Cleveland, 548 miles, at 40 miles an hour, including stops, has now been running a little over three months and it is reported to have arrived in Cleveland on time 99 days out of 100.

On Feb. 6, according to the New York Sun, the condensation of steam from the locomotives in the trainshed of the Pennsylvania railroad at Jersey City was sufficient to cause a fall of snow. The flakes were numerous enough to be noticable on the platforms. The weather was very cold.

The Chicago, Milwaukee & St. Paul has shortened the time of its through fast mail train which leaves Chicago at 3 a. m. It will run to St. Paul in 11 hours and from Chicago to Milwaukee in 1 hour and 45 minutes, or at the rate of 48 1/2 miles an hour. This train carries passengers between Portage and St. Paul.

Although January was a cold month and, in fact, unusually cold in the Southern States, the through passenger trains of the Chesapeake & Ohio between Cincinnati and Washington made almost perfect records. The "F. F. V." which is a pretty fast train, reached Washington on time 30 days, and on the other day was only 50 minutes late. Train No. 4 reached Washington on time 29 days.

The Northern Pacific has shortened the time of its fastest through train to 72 hours between St. Paul and Tacoma, about five hours less than the schedule heretofore in effect. The time is reduced chiefly in consequence of the opening of the new line of the Burlington connecting with the Northern Pacific at Billings, Mont. The connections at St. Paul are such that mail from the Pacific Coast is delivered in Chicago nearly 24 hours earlier than heretofore.

A Philadelphia paper tells a little story in which the United States Government played a trick on the railroads which worked in a way opposite to that intended. A party belonging to the Geological Survey sent their outfit home from Idaho by mail, including several tons of mineral specimens, with crowbars, shovels and picks. This saved a considerable freight bill, but it so happened that this shipment was made just at the time when the mails were being weighed to get a basis for the compensation to be paid to the railroad companies for the next four years. The Postmaster-General thinks that between the franking privilege and the rate of one cent an ounce for merchandise he has a hard row to hoe.

An attempt was recently made by the managers of five of the private stock car companies, the Burton, Street, Mather Horse and Cattle Car, Weeks, Canda and New England, to consolidate the operating departments of the five companies as a measure of economy, but it is given out that when the representatives of the companies got together and talked the matter over they were unable to agree as to the terms of the consolidation and the matter has been dropped for the present. It is likely to come up for consideration again, however, sometime in the near future. The managers were all agreed that a considerable saving could be effected in their operating departments by consolidation, and the only thing that stood in the way was the distribution of the expense of a joint department.

### Handling Snow on the Southern Pacific.

The serious blockades on the Southern Pacific, especially on the line in northern California, were noted in the Railroad Gazette of Feb. 1, page 75. In one avalanche the snow, earth and trees deposited upon the track made such a solid mass that the company washed it out with streams of water from hose, after the manner of hydraulic mining. Further interesting particulars are given in the following paragraphs taken from a press dispatch dated at Dunsmuir, Cal., Jan. 23: "The day has been warm and pleasant, with occasional snow flurries. As the promised hydraulic outfit did not come, Roadmaster Mott, with 300 shovellers, started in on the glacier-like mountain of snow at the foot of the avalanche. They shoveled all day but have made only a beginning. A line of sentinels was posted clear up to the source of the avalanche to give warning if another started. Superintendent Cooley left Sisson yesterday morning with the rotary and at 12 o'clock last night he had reached Bear Creek, 14 miles. The rotary got down to the shovellers at noon but is of no use for that kind of snow. It cannot advance a foot an hour. The men who run it could do more with shovels, as the snow is packed and icy and it has to be picked.

"Everybody here has been up to see the avalanche. By an accurate measurement Superintendent Cooley says the snowfall up to date is 31 feet, a little more than in the famous winter five years ago. On Black Butte summit it is at least 20 feet more. The delayed passengers have joined in with the citizens and are having a big ball to night. Three rotary snowplows are kept constantly moving on the exposed portion of the track, and gangs of experienced snow-shovellers are scattered along at all the threatened points and can be conveyed to any place on the road on short notice.

"At a few points on the line it has been found necessary to broaden the space between the snowbanks by shoveling, but in the main the rotaries have been sufficient to remove the snow as fast as it falls. Working in three feet of snow these machines will throw to a distance of 300 feet. In heavy drifts of eight feet and upward the machines throw to a distance of 50 feet or a little farther."

### Reasonable Wages.

Mr. Carroll D. Wright writing in the Forum on "Steps Towards Government Control of Railroads," maintains that the bill now pending in Congress providing that railroads shall pay "just and reasonable wages," is a step in "the silent revolution now going on," which is finally to place the government in control of the railroads. The bill, he declares, will make railroad employees "quasi public servants," and "though as a rule he would not allow the government to fix the wages of railroad employees," nevertheless he holds that "inasmuch as it is its right and duty to prevent the interruption of interstate commerce and the obstruction of the mails," in the exercise of this right it "ought to have a voice in making terms and adjusting the conditions of the employment of employees engaged in such service." He also maintains that such government interference on behalf of railroad labor would be a parallel to the government interference, through the pooling and Interstate Commerce bill, on behalf of merchants and shippers.

It is singular that as acute a man as Mr. Wright should not perceive the radical difference between government interference on behalf of shippers and government interference on behalf of labor, which lies in the fact that in the one case the government controls or can control both parties, and in the other it controls only one. It can make the shippers pay whatever the railroads charge, because the railroads furnish their only means of transportation, and it can make the railroads charge only reasonable rates, because it can punish the officers or remove them for disobedience. But although it may compel the railroads to pay "reasonable wages," it cannot compel the employees to consider them reasonable, or to accept them. Mr. Wright seems to be under the impression that laborers would not or could not strike if a government tribunal said the wages were reasonable, or that in any dispute with the corporations labor was in the wrong. If the government decided against labor it would



have no power whatever to enforce its decisions or make the men work on terms prescribed by it, and it they refused to abide by its decisions, as they undoubtedly frequently would, it would have to keep the roads open by military force just as it did last summer, and let the railroads get new labor as best they could. Never was there an odder hallucination than the notion that laborers would not strike if they were called "quasi public servants." They would strike under that appellation just as readily as under their present one whenever they wanted something which "the properly constituted tribunal" refused to give them. In the Chicago strike no special reverence was shown for "government" any more than for any other power. It was treated like any other "foe of labor," i. e., like anybody else who said the demands of labor were unreasonable.

Moreover, all interference of government between railroads and their employees would necessarily be the interference of politicians between a large body of voters and a small body of property-holders. Anybody who supposes that under these circumstances the large body of voters would not generally get the best of the controversy is not familiar with the history of labor strikes in this country. . . . A permanent tribunal for fixing the rate of wages would either have to consist of representatives of the parties to the bargain or of incompetents. As a representative of the government it would be a ridiculous body.

Mr. Wright and many other good people are trying to make legislation and governmental machinery supply the place of knowledge, good sense, and self-control on the part of the class of the community from which railroad employees are taken. . . . The countenance given by such articles as this to the assumption that in blocking the highways of a great nation in order to make Pullman arbitrate Debs was more than half right, and was removing "haze from the public mind," impedes the process of education by which alone the labor problem can be solved.—*Evening Post*, New York.

#### Non-Automatic Brakes in France.

The Ministry of Public Works of France has recently found it necessary to issue a circular to the Northern Railroad Company requiring that company to use automatic brakes. A synopsis of the circular will give a little railroad history showing how much better they do those things in France. It appears that as long ago as 1879 and 1882 the Ministry recommended that continuous brakes be, so far as possible, automatic. Experience having demonstrated the superiority of automatic brakes, all of the great companies except the Northern adopted them. This company, however, continues to use the non-automatic Smith-Hardy vacuum brake, being simpler and cheaper than the automatic; but a number of collisions and other accidents in 1891, '92, and '94 have called the attention of the Ministry to the conditions on that system. The company promised to look into the brake matter, and make experiments with a view to the introduction of automatic brakes, but in 1893 it formulated the objections to the automatic brakes which confirmed its decision to continue to use the non-automatic apparatus. The company confines itself simply to providing a second automatic compressed air apparatus for such of its vehicles as are interchanged with other railroads. Now the Ministry says that the express trains of that company must be equipped with automatic brakes as fast as possible, and lays down these very easy conditions: All trains which reach a speed of 45 miles an hour must be provided with automatic brakes within a year. Within two years those which reach 42 miles an hour must be so equipped. In as short a time as possible all trains on which continuous brakes are required must be provided with automatic brakes. Finally, all new vehicles designed for high speed trains must be equipped with automatic brakes when put into service.

#### Acquittal of Railroad Officers at St. Louis.

The traffic men who have been on trial at St. Louis for illegal reductions of freight rates have all gone free. Mr. Milton Knight and Mr. Spriggs were acquitted by instruction of the Court, the evidence against them being deemed insufficient. In the cases of the other three, Messrs. Field, Knight and Fell, the jury disagreed. These cases have been in the courts about five years, there having been five separate indictments, and acquittals having been secured on one or more of them at each trial.

#### The Debs' Trial.

The trial of E. V. Debs and a number of his associates in the United States Court at Chicago, which has been going on for three weeks, has been discontinued on account of the sickness of one of the jurymen, and a new trial is appointed to be held in May. Most of the evidence for the prosecution had been presented and some of that for the defense.

#### "A Narrow View."

"The railroad manager," says the *Railroad Gazette*, "who hires private cars and who has to sit up nights to keep the expenses of his own road below 75 per cent. of the receipts must find 'food for thought' in the figures" of recently published reports of private car companies whose expenses are only 39 per cent. of the receipts, and in the case of one—the Street Stable Car Co.—are three times what is necessary to pay interest on bonds and car trust notes. The *Railroad Gazette* is narrow in its views. As the railroad officer is in many cases wise enough to hold shares in the private car company with which as railroad officer he makes these ruinous contracts he finds not only "food for thought" in these figures but food for profits.—*Philadelphia Press*.

#### The Lake Erie & Ohio Ship Canal.

George M. Lehman, of Philadelphia, will have charge of the preliminary survey of the Lake Erie & Ohio Ship Canal. Mr. Lehman has recently been principal assistant to Professor L. M. Haupt, in charge of the field work in the survey recently completed of the ship canal connecting the Delaware River and Raritan Bay.

#### New York & Brooklyn Bridge Terminals.

At a meeting of the New York & Brooklyn Bridge Trustees last week a report was presented from the Committee on the Terminal Improvements, showing that the total expenditures would be \$2,041,913, which is over \$300,000 more than the amount fixed originally. The expenditures include \$321,327 for railroad and equipments; car storage yard and real estate, \$746,000; new Brooklyn station, \$120,000; reconstructed New York station, \$140,000; New York roadway, \$107,600; cable drawing plant, \$192,227.69.

The receipts for January showed a decrease as compared with December, of \$2,503. The daily average of passengers over the Bridge decreased 2,538. The total receipts for the month were \$303,495, and the expenditures were \$93,400, leaving in the treasury \$220,095.08. More passengers passed over the Bridge on Saturday last than on any other day since it was opened. The next best record was on Centennial Day, Oct. 12, 1892. It is estimated that 224,500 persons were carried over the Bridge

on Feb. 9. The number carried over Oct. 12, 1892, was 223,600. The receipts Saturday were \$6,185.76, whereas on Centennial Day they were \$6,467.40. They were less Saturday because a greater number of excursion tickets was sold. It is estimated further that during the two busiest hours on Saturday morning over 60,000 persons were carried across.

#### For a Railroad in East Africa.

Negotiations between the German Colonial Department and a group of bankers headed by the Deutsch Bank for the construction of a narrow-gauge railroad from a port on the German East African littoral to the Victoria Nyanza and Lake Tanganyika were concluded on Feb. 12. The estimated cost of the line is 30,000,000 marks. The German East African Co. is one of the parties to the scheme. Surveys for the road are to begin at once.

#### Southern Coal Mines.

Statistics of the total coal production of Alabama, Georgia and North Carolina in 1894 are given in a statement compiled by the United States Geological Survey. Alabama produced 4,377,977 tons, valued at \$3,932,007, against 5,136,935 tons in 1893, worth \$5,096,729. This was a decrease of 758,958 short tons, or nearly 15 per cent., and a loss in value of \$1,114,785, or over 20 per cent. The average price per ton declined during the year from 99 cents to 91 cents. During 1893 the mines gave employment to 11,294 men, while in the year just closed 10,789 men were employed. The total production of Georgia in 1894 was 354,111 short tons against 372,740 tons in 1893, a decrease of 18,629 short tons, or about 5 per cent. The value was \$365,972 in 1893, and only \$290,290 in 1894. The average price per ton at the mines fell from 98 cents to 84½ cents, a decline of 13½ cents per ton.

#### Lake Shipbuilding.

The Chicago Shipbuilding Co. has now under way tonnage to the amount of 21,000 tons capacity, having just taken a 6,000 gross ton schooner to tow behind the big lake steamship Aurora. Outside of whalebacks and the two steel barges just launched by the same builders for the Minnesota Iron Co., there is no towing vessel on the lakes carrying over 2,500 tons. The problem of handling such a vessel behind the ordinary lake steamer is no light one. Including the two schooners for the Minnesota Iron Co., just launched and still at its yard, the Chicago Shipbuilding Co. has 30,000 tons of new work on hand, a greater amount than ever at any lake yard, and equalled only in America by the Clapp yard at Philadelphia. About 1,100 men are at work in this Chicago yard. During a 12-months ending several years ago the Globe Iron Works Co., of Cleveland, put out 12 ships of large size, and this company and the Wheeler concern at West Bay City have heretofore led in lake tonnage building.

#### The Harris Car Co.

We have received a letter from Mr. L. J. Harris, President of the Harris Car Co., denying the statement, made on page 92 of our last issue, that the Harris Palatial Car Co. has gone to pieces. He says that it is still in existence, with 178 stockholders. It owns patent No. 403,265, which it has assigned to the Harris Car Co., and the latter is now preparing drawings for a car which will far outshine the Jeannette. The company now controlling the Jeannette was formed by directors of the Harris Co., who disagreed with Mr. Harris and his friends.

#### Steel Works at Buffalo.

Buffalo is to be the next large city on the lakes which is to enter the arena as a large steel producer. A movement is on foot, supported by interests in the Lehigh Valley, to build four modern blast furnaces and put up a Bessemer plant capable of producing 1,200 tons of ingots a day. Buffalo is now generally acknowledged in the iron trade to be an admirable locality for the manufacture of iron. Materials can be very cheaply assembled, and aside from an important local market, the city is splendidly located for the distribution of product. It possesses a commanding position to reach the consumers of an important section of the country and could incidentally take care of what demand there is in the chief industrial section of Canada. The success of the Buffalo furnaces, which supply the foundry trade, holds out a good promise of a great future for a modern steel plant.—*Iron Age*.

#### Conneaut Car Ferry.

It is expected that one of the car ferry steamers, being built at the Craig Shipbuilding Yards, at Toledo, O., for the Pittsburg, Shenango & Lake Erie, will be completed by July 1, and the second will be ready by August 1.

#### The Vestibule in Germany.

Vestibule trains seem to be growing in use in Germany, and the work of equipping the cars of express trains on the Prussian State railroads with vestibules is being carried on. Twenty vestibule trains are now in service and twenty-eight are to be added as rapidly as practicable. The trains are operated on the parlor-car system, that is to say, with numbered seats for which special tickets are issued and a higher rate of fare is charged.

#### Transatlantic Passengers.

During the past year 879 passenger vessels arrived at New York from European ports, 96 fewer than in 1893. The number of passengers carried was very much less, only one-half as many steerage passengers going westward as in previous years. As seen from the table, the number of cabin passengers has decreased 24 per cent., the number of steerage passengers 48 per cent., while the number of trips has decreased only 11 per cent.

|           | Vessels. | Cabin.  | Steerage. |
|-----------|----------|---------|-----------|
| 1894..... | 879      | 92,561  | 188,164   |
| 1893..... | 975      | 121,829 | 364,700   |

The decrease has been much greater with the Continental than with the British lines, and is due, in great part, to the restrictive measures against immigration. Some of the Continental liners have carried only one-tenth or one-twelfth of the number of steerage passengers carried in previous years.

The Cunard line carried about the same number of cabin passengers as last year, but about 6,000 less steerage. The American line shows a slight decrease in both. The White Star line lost, compared with previous years, from 65,000 to 68,000 steerage passengers, and yet carried more last year than any other line. The North German Lloyd steamers, making double as many trips as the English vessels, carried about the same number of passengers. In the three former years, the steerage passengers rose from 6,500 to 6,800. In 1894 the total dropped to 19,927. In the Mediterranean trade, the steerage passengers dropped only about 4,600. Four years ago the Hamburg American company carried four times as many steerage passengers as in 1894. They lost about 3,500 cabin passengers.

The French Transatlantic line took only about one-third as many steerage passengers as in 1891. They

suffered heavily in passenger traffic. The Red Star line lost 2,500 cabin and 15,800 steerage passengers. The Glasgow lines decreased in cabin passengers 4,000 and steerage 10,000. Six Continental emigrant carrying lines carried in 1893, 54,491, in 1894, 24,078. We printed last week a table of the passengers landed by the several lines at New York during 1894.

#### LOCOMOTIVE BUILDING.

The Delaware & Hudson Canal Co. has given an order to the Schenectady Locomotive Works for three 8-wheel passenger locomotives.

The Delaware, Lackawanna & Western has given an order to the Dickson Mfg. Co. of Scranton, Pa., for two 8-wheel passenger locomotives.

The Baltimore, Chesapeake & Atlantic Railroad, will soon award a contract for building several compound locomotives. They are to be completed by May.

#### CAR BUILDING.

It is reported that the Central of Georgia will build about 150 cars at its shops.

Two hundred refrigerator cars are to be built at once by the California Fruit Transportation Co.

The Central Railroad of Georgia will soon begin the construction of 100 freight cars at its own shops at Savannah, Ga.

The Haskell & Barker Car Co., of Michigan City, Ind., has an order for 1,000 freight cars for the Illinois Central as well as 300 refrigerator cars.

The Duluth & Iron Range let the contract last week for 400 of the ore cars mentioned in the *Railroad Gazette* of Jan. 4, to the Pullman Car Company.

The force at the Wagner car shops at Buffalo was last week increased by 100 men. There is a large amount of work yet to be done in getting the company's equipment in shape for the summer season.

The St. Louis, Alton & Terre Haute has awarded to the Mt. Vernon Car Co. the construction of 75 42-ft. furniture cars, and 50 60,000 lb. ordinary box cars, both to be equipped with automatic couplers and Westinghouse air brakes.

The Pennsylvania Midland has given an order to Murray, Dougal & Co., of Milton, Pa., for freight cars.

Bids have been received by the officers of the Delaware, Lackawanna & Western for 500 coal cars. No award has yet been made and it is probable that no part of the order will be given out for some time. It is not yet definitely settled whether this number of cars, or in fact, any number will be built.

The Toledo, Ann Arbor & North Michigan order for freight cars which was first talked of last fall will, it is stated, be given out in a few weeks. The number of cars in the contract is 565.

The Southern Pacific is in the market for 18 passenger cars.

The Pullman Car Co. has received an order for nine vestibuled coaches for the Boston & Maine, and for 15 for the Maine Central. These cars are intended for the through trains between Boston, Portland, Bangor, Bar Harbor and eastern points. The new cars will be of same pattern as those which have been in use on the through Pullman trains for the past year or more.

#### BRIDGE BUILDING.

Aitken, Minn.—A bill to appropriate \$8,000 for the construction of a wagon bridge across the Mississippi River, at Aitken, has been introduced in the Minnesota Legislature.

Atlanta, Ga.—The committee having in charge the erection of a new bridge at Broad street, Atlanta, will soon receive bids for the structure. All idea of repairing or rebuilding the present bridge has been abandoned and a new structure will be erected. The bridge will cost about \$25,000. The City Council has not yet agreed to appropriate this amount for the bridge.

Baltimore, Md.—A measure appropriating \$33,000 for a new steel bridge over Gwynn's Falls, on Wilkens avenue, was submitted to the City Council last week. It directs that the old wooden bridge at that place be removed. A member has offered a resolution appropriating \$10,000 for the construction of a steel foot bridge over the tracks of the Baltimore & Ohio Railroad at the foot of Fulton avenue and connecting with Carroll Park.

Buffalo, N. Y.—A bill appropriating \$9,500 for the construction of a wrought iron bridge over the canal at Mill street in Buffalo has passed the New York legislature.

Dodge County, Minn.—A bill appropriating funds to repair or build bridges in Dodge county has been introduced in the Minnesota Legislature.

Johnstown, Pa.—A movement is under way to compel the Pennsylvania Railroad Co. to replace the famous stone bridge, at Johnstown, with other structures. Councils have ordered the city solicitor to investigate the question, and report at once.

Mille Lacs County, Minn.—A bill to appropriate money to build a bridge across Rum River in Mille Lacs County is now before the Minnesota Legislature.

Natchez, Miss.—The Board of Supervisors at Natchez, has awarded the contract to the King Bridge Co., of Cleveland, Ohio, for the construction of an iron bridge over the Homochitto River, which will connect Adams and Wilkinson counties, the contract price being \$4,999. There were 19 bidders for the work.

New York City.—The Berlin Iron Bridge Co., has lately completed for the Aqueduct Commissioners of New York City two iron bridges, one at reservoir M., the other at reservoir D.

Olmstead County, Minn.—A bill to appropriate \$15,000 to build a bridge across the Zumbro river in Olmstead county is pending in the Minnesota Legislature.

Rockefeller, Tex.—A bill has been introduced in the Texas legislature to appropriate \$12,500 for constructing a bridge over the Gunnison River.

St. Louis.—The bill authorizing the erection of a bridge over the Mississippi River between St. Louis and East St. Louis has been reported favorably to the United States Senate and placed upon the calendar. This bill passed the House during the last session. It was antagonized by some interests in St. Louis and was not acted upon in the Senate for several months. An amendment to the effect that the bridge should not be built between the two bridges now in existence was proposed, but was opposed, and has now been withdrawn.

Utica, N. Y.—An appropriation of \$18,000 for the removal of a bridge over the Erie Canal in Utica, and the



erection of a new lift bridge is provided in a bill now before the State legislature.

**Wilkin County, Minn.**—A bill to appropriate \$2,000 to Wilkin county to aid in building a bridge across the Red River has been introduced in the Minnesota legislature.

#### RAILROAD LAW—NOTES OF DECISIONS.

##### Powers, Liabilities and Regulation of Railroads.

In the State of Washington the Supreme Court held that where both the constitution and the statute declare the rolling stock of a railroad company to be personal property a mortgage by the company on its road and rolling stock, executed and recorded as a real estate mortgage, but not executed as required by statute to make it good as a chattel mortgage, is void as to the rolling stock as between the mortgagee and the creditors of the company.<sup>1</sup>

In West Virginia it is ruled that a railroad chartered by the State cannot by contract turn over to another company its road and the use of its franchises and thereby exempt itself from responsibility for the conduct and management of the road.<sup>2</sup>

In the Federal Court it is laid down that where the chief consideration moving to the lessee railroad company is that the road of the lessor shall be operated under the supervision of the lessee, the appointment of a separate receiver for the leased road, and his assumption of independent control, is sufficient to justify the receivers of the lessee company in renouncing the lease.<sup>3</sup>

In the Federal Court it is held that receivers of a lessee railroad company are not bound, merely by their appointment, to perform the obligations of all its executory contracts and leases; but they have a reasonable time in which to determine whether they will assume or renounce them. And where numerous contracts are to be examined, and a determination reached in respect to each of them, a delay of 65 days before renouncing a lease is not unreasonable.<sup>4</sup>

In Kentucky the Supreme Court of Appeals rules that the crossing of the track of a railroad company by the rails and cars of a street railway company is not an appropriation of the property of the former to use of the latter for which there should be compensation, but merely a mode of exercising the public right of transit along the highway.<sup>5</sup>

A statute of Iowa provides that a railroad corporation may construct its road across, over, or under any railway, when necessary, and it shall so construct its crossings as not unnecessarily to impede travel on the railway crossed, and be liable for the damages occasioned thereby. The Supreme Court rules that the corporation constructing its road across another has not the absolute right to elect whether it will make grade, over or under crossings, and that where it threatens to make crossings that will unnecessarily interfere with the use of the railway crossed, the courts have jurisdiction to prevent it.<sup>6</sup>

In South Carolina it is held that the statute making a railroad company liable for damages occasioned by fire communicated by its locomotives, irrespective of the question of negligence, is constitutional.<sup>7</sup>

The Supreme Court of Illinois rules that the statute prohibiting persons from selling railroad or steamboat tickets without a certificate of authority from the company, is not unconstitutional as interfering with interstate commerce, or as being special legislation.<sup>8</sup>

In Montana the Supreme Court rules that it has no jurisdiction to compel an interstate railroad company to operate its road within the State, in the face of a general strike, on the allegation that enough competent men are willing to work "for reasonable compensation."<sup>9</sup>

The Supreme Court of Texas rules that a statute providing that any stipulation in a contract shall be void which limits the period in which to sue thereon to less than two years, or which requires notice of claim for damages to be given within less than 90 days after the damage is applicable to interstate shipments, and is not void as being a regulation and interference therewith.<sup>10</sup>

##### Injuries to Passengers, Employees and Strangers.

In New York plaintiff got on an elevated railroad car, which was so crowded that he could just get standing room on the platform. When the car reached the next station plaintiff got off, but before the car started he went on the platform again, though it was as much crowded as before, and was injured in consequence of its crowded condition. The court holds that plaintiff was chargeable with contributory negligence.<sup>11</sup>

The Supreme Court of Michigan rules that it is a "just and legal excuse" for not stopping at a station to let off three passengers—laborers who had been drinking—that it was after dark, the snow was deep and drifting, and that as the engineer and conductor knew, a freight train was close behind, and the only place near the station where they could stop without danger of being stalled by the snow was on a bridge and elevated track.<sup>12</sup>

In New York the Supreme Court rules that in an action against a railroad for causing plaintiff to alight in the evening at a station two miles from her destination no recovery can be had for injuries to plaintiff's health, caused by walking from such station to her destination, where she could have discovered a place to stay over night had she inquired, and she knew that her health was such that she might be seriously affected by the walk.<sup>13</sup>

The Supreme Court of Texas declares that the test of whether one was guilty of contributory negligence is not what would be done by a prudent man generally, but what a man of ordinary prudence and care would do under similar circumstances to avoid injury.<sup>14</sup>

In the same State it is held that a railroad owes the same degree of care to a passenger on a freight train that it owes to one on any other train.<sup>15</sup>

In Texas it is held that where a railroad furnishes for the use of one of its engines inferior coal, which causes flame to burst out of the door and injure a fireman, and the company might have known, by the exercise of reasonable diligence, of the character of the coal, and the fireman did not know the danger attending its use, the company is liable for the injury thereby caused.<sup>16</sup>

In the Supreme Court of the United States it is ruled that a common laborer employed by the company owning and operating a railroad, and working under direction of a section foreman, on a culvert thereon, is a fellow servant with the engineer and conductor of a passenger train on the road in such sense as exempts the company from liability for an injury to him through negligence of such conductor and engineer in operating the train.<sup>17</sup>

In Texas plaintiff, a section hand on defendant's railroad, was injured by defendant's train while moving a hand car by order of the foreman, to whose orders he was subject, and who, though in a better condition to see the coming train gave no warning. Plaintiff saw the train, but thought the car could be removed in time. The Supreme Court decides that the foreman was negligent, and that plaintiff was free from contributory negligence.<sup>18</sup>

In the same State it is held that where the handles of a turntable are insufficient for turning it, owing to its being out of repair, and the employees, with the knowledge

and under the direction of a vice-principal, get into the pit to turn the table, they will not be held negligent in so doing.<sup>19</sup>

In Texas it is held that where a railroad has notice that a large number of pedestrians use its tracks at a particular place, and takes no steps to prevent this use, it is negligent for its train to approach such place without giving warning.<sup>20</sup>

In Mississippi it is laid down that servants of a railroad are not bound to keep a lookout for trespassers, but if they see one, and realize his danger, and that he cannot, by the exercise of reasonable effort, extricate himself, they must exercise reasonable care to prevent injury to him.<sup>21</sup>

- <sup>1</sup> R. vs. T. & P., 36 Pac. Rep., 460.
- <sup>2</sup> Fisher vs. W. V. & P., 19 S. E. Rep., 578.
- <sup>3</sup> Ames vs. U. P. Ry. Co., 60 Fed. Rep., 966.
- <sup>4</sup> Ames vs. U. P. Ry. Co., 60 Fed. Rep., 966.
- <sup>5</sup> E. L. & B. S. vs. A. & C., 26 S. W. Rep., 181.
- <sup>6</sup> C. B. & O. vs. C., Ft. M. & D. M. Ry. Co., 58 N. W. Rep., 919.
- <sup>7</sup> Lipfield vs. C. & A., 19 S. E. Rep., 497.
- <sup>8</sup> Burdick vs. People, 36 N. E. Rep., 948.
- <sup>9</sup> State vs. Great Northern Ry., 36 Pac. Rep., 458.
- <sup>10</sup> G. C. & S. F. vs. Eddins, 26 S. W. Rep., 161.
- <sup>11</sup> Graham vs. Manhattan, 28 N. Y. S., 739.
- <sup>12</sup> Reed vs. D., S. S. & A., 59 N. W. Rep., 144.
- <sup>13</sup> Childs vs. N. Y., O. & W., 28 N. Y. S., 894.
- <sup>14</sup> M. K. & T. vs. Wylie, 26 S. W. Rep., 85.
- <sup>15</sup> Mex. Cent. vs. Lauricella, 26 S. W. Rep., 301.
- <sup>16</sup> M. K. & T. vs. Walker, 26 S. W. Rep., 513.
- <sup>17</sup> N. Pac. vs. Hamby, 14 S. Ct., 983.
- <sup>18</sup> T. & P. vs. Lewis, 26 S. W. Rep., 873.
- <sup>19</sup> G. C. & S. F. vs. Winton, 26 S. W. Rep., 770.
- <sup>20</sup> T. & P. vs. Watkins, 26 S. W. Rep., 760.
- <sup>21</sup> Christian vs. Ill. Cent., 15 South Rep., 71.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Chicago & Alton* quarterly, \$2 per share on the preferred and common stock, payable March 1.

*North Pennsylvania* quarterly, 2 per cent., payable Feb. 25.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Atlanta & Charlotte Air Line*, New York City, March 13.

*Missouri Pacific*, annual, St. Louis, Mo., March 12.

*St. Louis, Iron Mountain & Southern*, annual, St. Louis, Mo., March 12.

*Texas & Pacific*, annual, New York City, March 20.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Freight Claim Association* will hold its annual meeting in Chicago on March 13. The headquarters will be at the Auditorium. The Secretary is S. A. Mehoffer, of Philadelphia.

The *Car Accountants' Association* will hold its next meeting at the Palace Hotel, San Francisco, Cal., on April 16, 17, 18 and 19.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cin-

cinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

The *Western Foundrymen's Association* meets in room 701, Western Union Building, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2.30 p. m., from October to May inclusive, at their Association Rooms in Lincoln Hall, Ithaca, N. Y.

##### Society of Boston Civil Engineers.

A regular meeting of the Boston Society of Civil Engineers was held at its rooms 36 Bromfield street on Jan. 23. President William E. McClintock in the chair, 121 members and visitors present. The record of the last meeting was read and approved. Messrs. Albert S. Cheever, Chief Engineer, Fitchburg railroad, and James W. Rollins, Jr., Resident Engineer, N. Y. N. H. & H. R. R., were elected members of the society. Messrs. Desmond Fitzgerald, A. E. Burton, R. A. Hale, F. W. Hodgdon and F. C. Coffin were elected a committee to nominate officers for the ensuing year. Mr. Henry Manley was appointed a committee with full powers to make the necessary arrangement for the annual dinner of the society. The president announced the deaths of Phineas Ball and Lincoln C. Heywood, members of the society, and on motion he was authorized to appoint committees to prepare memoirs. The committees appointed consisted of Messrs. Chas. A. Allen and Lucian A. Taylor on memoir of Mr. Ball, and George A. Carpenter and Morris Knowles on memoir of Mr. Heywood. The thanks of the society were voted to James A. Fenno, Superintendent of the B. R. B. & L. R. R. for courtesies shown the members on the occasion of the trip to the tunnel at East Boston. An interesting paper was read by Mr. Corydon T. Purdy, C. E. of New York, entitled "The Use of Steel in Large Buildings," fully illustrated by lantern views of a number of the most noteworthy high buildings in New York, Chicago and Buffalo. After passing a vote of thanks to Mr. Purdy for his valuable and interesting paper the society adjourned.

##### The Western Society of Engineers.

The Western Society of Engineers met in Science Hall, Armour Institute, Chicago, on Wednesday, Feb. 6, at 8 p. m. There were about 200 in attendance. President Horton occupied the chair, and President Gunsaulus, of the Institute, welcomed the society. The evening was devoted to the Chicago drainage canal. Two papers on this great engineering work were presented, embodying a description of the work and methods of construction on the Brighton and Summit divisions thereof—Mr. Alex. E. Kastle describing the first, and Mr. E. R. Shnable, the second named division. The papers were fully illustrated by lantern views, more than 50 being presented altogether. These views, prepared by students of the institute, were projected from a high power electric lantern and were notably excellent in brilliancy and definition.

The members dined at the Grand Pacific at 6 p. m., and went thence to the Institute where, prior to the opening of the meeting, the various laboratories and shops, the library, museum and gymnasium were carefully inspected under the guidance of President Gunsaulus, members of the faculty and the students. The visitors were loud in their praise of the beauty, convenience and scrupulous cleanliness of the Institute, and of the completeness of its equipment, and when, after adjournment, they were taken to the cooking school and served with coffee and sandwiches they were more than ever convinced that manual training schools are a good thing.

##### International Association of Car Accountants.

The annual meeting of the Car Accountants Association will be held at the Palace Hotel, San Francisco, Cal., on April 16, 17, 18 and 19. Arrangements have been made for a special train to leave Chicago via the Chicago & Northwestern on Saturday, April 6, going west by way of the Chicago & Northwestern, Union Pacific, Union Pacific, Denver & Gulf, Atchison, Topeka & Santa Fe and Southern Pacific, arriving at San Francisco, Monday, April 15, stops being made at Denver, Santa Fe, Pasadena, Los Angeles and San Diego. Returning, the train will leave San Francisco, Saturday, April 20, via the Southern Pacific (Shasta Route), Northern Pacific and Chicago, Milwaukee & St. Paul, arriving at Chicago on Wednesday, May 1; stopping at Portland, Tacoma, Seattle and St. Paul. Arrangements for accommodations on the special train should be made in advance with Mr. Frank M. Luce, Chicago & Northwestern, Chicago, Ill., Chairman of Committee on Arrangements.

##### Engineers' Club of Philadelphia.

A business meeting of the club will be held on Saturday, Feb. 16, at 8 p. m. A paper by C. H. Ott, on "A Problem in Hydrostatics and its Ingenious Solution," will be read.

At the regular meeting, Feb. 2, 65 members and visitors were present, President George S. Webster in the chair. A paper was read by Mr. V. Angerer on "Investigation and Experiment for the Determination of the Groove in Guard-Rails for Street Railways." The object of this investigation was to find the most desirable shape for the groove to be used in the guard-rails for curves on street railways, especially those operated electrically, the fundamental idea being that these grooves should be laid out corresponding to the lines of wear, so as to prevent from the start the largest possible wearing surface to the action of the wheels, in order to prolong the life of the rail. An ingenious method was used to determine this most desirable shape of groove. Rails of potter's clay without groove were used, and hard wood wheels, revolved by hand along the rails, cut by means of their flanges, a groove into the soft clay. The wheel used had the Whitney standard flange for electric cars and representative sections of track were obtained for three different sizes of wheel in common use, the four ordinary lengths of wheel base, and radii of curvature for the rail differing by 5 ft. from 30 to 65 ft. The proper height for guards at the side of the rail was next considered, and a method of calculating the values was explained. Mr. C. G. Barth gave a resume of his paper on "Principles of Calculus in a New Light."

##### Western Railway Club.

The Western Railway Club will meet Tuesday, Feb. 19, at 2 P. M., in the Auditorium Hotel, Chicago. Mr. Delano's paper on "English Railway Practice," which was presented at the January meeting will be discussed with the idea of showing wherein we can to advantage borrow from or improve upon the practice of our English cousins. A topical discussion will follow, devoted to the closely allied topics of "Stationary Boiler Practice and



Shop Heating," which discussion will be opened by Mr. C. M. Higginson, of the C. B. & Q. R. R. A report from the Committee on "Revision of the Interchange Rules" will be presented. The paper of the day will be presented by Mr. George Gibbs, of the C. M. & St. P. Ry., entitled "Notes on Modern Practice in Signalling."

#### Engineers' Club of St. Louis.

A regular meeting of the club was held Feb. 6, with President Russell in the chair, there being 26 members and six visitors present. The further discussion of Mr. B. L. Crosby's paper upon the St. Louis Extension of the St. L. K. & N. W. R. R., read Dec. 19, was taken up. Mr. Crosby exhibited a number of lantern slides showing foundation work on the piers of the Sioux City, Nebraska City, Rulo and Bellefontaine bridges across the Missouri river, and the Alton and Memphis bridges across the Mississippi. The Morrison clay hoist, and sand pump were described in detail, as were also the details of the caisson work, and the use and construction of airlocks. Figures were given showing the cost of deep foundations at different places. The reading of Mr. Curtis' paper on "A System of Water Purification" was deferred until the next meeting, Feb. 20.

#### Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society was held Feb. 4 with President Stevens in the chair, and 11 members and one visitor in attendance. Mr. Armstrong reviewed and illustrated three United States Supreme Court decisions in the matter of riparian boundaries. Mr. Münster gave his theory of the failure to fall of two heavily loaded spans of the University Avenue Bridge after the destruction of the post common to the two by a derailed cattle train.

#### Engineering Association of the South.

The regular monthly meeting was held at Nashville, Tenn., Feb. 14. A paper was read by Prof. W. H. Schuerman, upon "A Method of Determining the Probable Volume of Traffic of a New Road." "The Preservation of Iron Surfaces," was the subject for topical discussion.

### PERSONAL.

—Mr. Wilbert Erwin, Superintendent of the Texas Central railroad, fell from a train near Terrell, Tex., on Feb. 25, and was instantly killed.

—Mr. H. Bromley is now Division Freight Agent of the Lake Shore & Michigan Southern at Cleveland, O. His title was recently General Agent.

—Mr. George A. Burt, of New York, has been appointed General Manager of the Ohio River Railroad, with headquarters at Parkersburg, W. Va.

—Mr. H. R. Rogers has been appointed General Freight Agent, and W. P. Herman General Passenger Agent of the Cleveland & Buffalo Transit Company.

—Col. William H. Ross has succeeded Mr. N. E. Harris as Receiver of the Macon & Northern Railroad in Georgia. Mr. Harris becomes Vice-President and General Counsel.

—The new Kansas Railroad Commissioners have organized with Samuel T. Howe as Chairman of the Board, Mr. Frank Fleenkin, of Emporia, Tex., being elected Secretary.

—Mr. T. H. Spencer has been appointed Supervisor of the Southern Railway on that part of the line running from Durham, N. C., to Keysville, Va., with headquarters at Oxford, N. C.

—Mr. J. Nelson Patrick, of Omaha, Neb., has been appointed Government Director of the Union Pacific Railroad. He succeeds the vacancy caused by the death of Mr. J. W. Paddock, of Omaha.

—Mr. J. M. Aubrey, Sr., formerly General Agent of the Merchants' Dispatch Transportation Co., at Chicago, has been appointed General Manager of the Spring Car Transportation Co., with headquarters in Chicago.

—Mr. J. Kemp Ridgley, now District Passenger Agent of the Louisville & Nashville road, with headquarters at Memphis, has been appointed General Northern Passenger Agent of the line, with headquarters at Chicago.

—Mr. Thomas Riley, formerly General Superintendent of the St. Louis, Kansas City & Colorado at St. Louis, has been appointed Superintendent of the Monterey & Mexican Gulf road, with headquarters at Monterey, Mex.

—Mr. J. M. Aubrey, Sr., has been appointed General Manager of the Spring Car Transportation Co., with headquarters at Chicago. He was formerly General Agent in Chicago for the Merchants' Dispatch Transportation Co.

—Mr. Jonathan Tipton has been appointed General Freight and Passenger Agent of the Knoxville, Cumberland Gap & Louisville road. Mr. Tipton has long been connected with the East Tennessee, Virginia & Georgia road.

—Mr. G. B. Renton, Secretary of the Grand Trunk Railway, at its offices in London, Eng., died in that city last week. Mr. Renton had been with the Grand Trunk Co. for over 20 years, nearly all that time as its Secretary.

—Mr. William W. Anstey, who died in New York City last Friday, was a veteran among the officers of the New York Central & Hudson River Railroad Co., having been identified with the audit department for over 28 years, being one of its Auditors at the time of his death.

—The North Carolina Legislature has reduced the annual salaries of the three railroad commissioners of that State from \$2,000 to \$1,500 each. The term of Hon. Thomas W. Mason, one of the commissioners, expires this month and S. Otho Wilson, a Populist, will be elected by the "fusion" Legislature to succeed him, Mr. Mason being a Democrat.

—Mr. John L. Lathrop, General Auditor of the Chicago, Burlington & Quincy railroad, died at his home at Chicago, on Feb. 8, in his seventy-sixth year. He had been with the Burlington road for 17 years, and in 1880 succeeded the late Mr. Tyson as General Auditor. He was born in Wilbraham, Mass., and was formerly connected with the Connecticut River railroad.

—Mr. H. A. White, Division Superintendent of the Chicago, Rock Island & Pacific, with office at Trenton, Mo., died in that town last week. Mr. White had been with the Rock Island road since the year 1877. He was conductor on that road for four years, then Trainmaster for four years, becoming Division Superintendent four years ago. He was with the Erie road before going to the Rock Island.

—Mr. H. F. Bickell, Assistant Trainmaster of the Pennsylvania, with headquarters at Pittsburgh, has resigned his position to accept the division superintendency of the Lake Erie & Western railroad, with headquarters at Lima, O. Mr. Bickell was for some years train dispatcher of the Pennsylvania and for over five years Chief Clerk to Superintendent Turner. He was promoted to be Trainmaster about a year ago.

—Mr. H. R. Maynard, who has been New England Agent of the Atlantic Coast Line, with office in Boston for the last seven years, resigned that office on Feb. 1, and is now located in New York City as assistant to the Traffic Manager of the Clyde Line of steamships. Mr. J. H. Johnson, who has been Traveling Passenger Agent of the line since May a year ago, succeeds Mr. Maynard as New England Agent. Mr. Johnson was formerly with the Pennsylvania railroad.

—Mr. John L. Lathrop, General Auditor of the Chicago, Burlington & Quincy railroad, died at Chicago last week, aged 76 years. Mr. Lathrop since 1857 had been connected in important positions with railroad interests, and was an authority in matters of railroad accounting. During the last 17 years he had been with the Chicago, Burlington & Quincy railroad, and he had held the position of General Auditor since the death of the late Mr. Tyson, in 1880. Mr. Lathrop was born at Wilbraham, Mass., July 4, 1819. In 1850 he became connected with the Connecticut River Railroad Co. In 1857 he removed West and was chosen Secretary and Treasurer of the Hannibal & St. Joseph Railway Co., which position he held until 1873, when he was appointed General Manager of the company's land interests. In 1878 he was appointed Assistant General Auditor of the Chicago, Burlington & Quincy, and on the death of Mr. Tyson he was promoted to the rank of General Auditor.

—Mr. Charles W. Copeland, a widely-known marine and mechanical engineer, died at his home in Brooklyn (where he had lived for the last 50 years), on the fifth of this month. Mr. Copeland was born in Coventry, Conn., in 1815, and was the son of Daniel Copeland, a builder of steam engines and boilers in Hartford. The son was trained as a marine engineer under his father. When he was 21 years old he became designing engineer for the West Point foundry, and there designed, and had to do with the construction of, engines for many of the earliest steamers. In 1839 he was appointed naval engineer for the navy, his bureau at that time being responsible for the steam engineering. In this position he designed the machinery for some of the earliest steam vessels of the navy. Later, he became Superintending Engineer for the Allaire Works, New York, where he designed and built the machinery for the Collins steamers Pacific and Baltic as well as for other vessels. During the war he was concerned in fitting up steamers for the river service and since the war has been Consulting and Superintending Engineer to the United States Lighthouse Board. He was Director in and Consulting Engineer to the Norwich & New York Transportation Company, and designed the steamers City of New York, City of Boston, and City of Worcester. Mr. Copeland was a man in whom his friends placed implicit confidence, and his judgment in general business matters as well as in his profession, was sound. He was always considerate in his dealings with subordinates, and gave them due credit for their own ideas. He was for many years Treasurer of the American Society of Mechanical Engineers, of which he was a charter member.

### ELECTIONS AND APPOINTMENTS.

**Cincinnati, Jackson & Mackinaw.**—At the annual election of the railroad company in Toledo, last week, directors were chosen as follows: Calvin S. Brice, Samuel Thomas, John G. Moore, Nelson Robinson, Geo. L. Bradbury and R. T. Wilson, Jr., of New York; W. B. Richie, of Lima, Ohio, and F. B. Drake and N. H. Swayne, of Toledo.

**Cleveland & Buffalo Transit Co.**—The office of General Freight and Passenger Agent has been abolished. H. R. Rogers has been appointed General Freight Agent, and W. P. Herman General Passenger Agent, with headquarters at 137 River street, Cleveland, O.

**Huntingdon & Broad Top.**—At the annual meeting of the stockholders at Philadelphia, Feb. 5, Spencer M. Janney was re-elected President, and the following directors were chosen: James Long, James Whitaker, Thomas R. Patten, Jacob Naylor, William Bault, Samuel Bancroft, Jr., John Hopkins, George H. Colket, Robert H. Crozer, William H. Shallcross, Lewis A. Riley, Harrison K. Caner.

**Louisville & Nashville.**—J. Kemp Ridgley, formerly stationed in Memphis, has been appointed Northern Passenger Agent of that road, with headquarters in Chicago.

**Massillon & Cleveland.**—Officers were elected at the annual meeting, Feb. 5, at Massillon, O. as follows: Directors, Charles W. Cass, New York; John Sherman, Mansfield; P. G. Albright, Massillon; William F. Robb, Pittsburg; Henry Amy, New York; Charles Lanier, New York; L. B. Harrison, Cincinnati; Henry C. Urner, Cincinnati, and M. A. Hanna, Cleveland.

**Ohio River.**—George A. Burt, of New York, has been appointed General Manager, vice J. Clinton Gardiner, who resigned Jan. 1. Mr. Burt will make his headquarters at Parkersburg, W. Va.

**Philadelphia & Erie.**—The following Board of Managers were elected at the recent annual meeting: N. Parker Shotridge, John H. Catherwood, John P. Green, Samuel Gustine Thompson, J. Bayard Henry, William L. Elkins, Henry D. Welsh, William J. Howard, Amos R. Little and W. H. Barnes.

**Pennsylvania Midland.**—The following were elected at Huntingdon, Pa., on Feb. 6: President, Theodore Gerish; Portland, Me.; Secretary, Samuel Spyker, Huntingdon; Chief Engineer, J. Murray Africa, Huntingdon, Pa.; Treasurer, W. Grant Wilson, Harrisburg; Directors, George B. Orady, John Whitehead, Huntingdon; J. S. Winslow, Theodore Gerish, Portland, Me.; J. L. H. Cobb, Lewiston, Me.; R. W. Dunn, Waterville, Me.; Frank W. Childs, New York; Harry Cessna, Bedford; F. J. Kooser, Somerset; J. I. Woodcock, Hollidaysburg; C. P. Dull, McVeytown.

### RAILROAD CONSTRUCTION.

#### Incorporations, Surveys, Etc.

**Brainerd & Northern Minnesota.**—This road, now extending from the upper limits of the Mississippi & Rum River, Boone county, at Brainerd to Leech Lake, Minn., is to be extended northwesterly 20 miles. It will reach the eastern extension of the Great Northern at Fosston, Minn., and very probably connect with that line. It will open, primarily, a large timber area, and as well a fine agricultural and stock section.

**Columbus, Hocking Valley & Athens.**—The company has secured rights of way for its road through all of Athens and Hocking counties, Ohio, except at one or two places. Its agents are now at work securing rights of way in Franklin County, and General Counsel Sleeper says the company expects to begin the construction work by April 1.

**Dallas Terminal.**—The city council of Dallas, Tex., has passed an ordinance granting right of way over all

streets necessary to the Terminal Railway Company. President W. C. Connor says that the company expects to begin work about April 1 on the belt line around the city of Dallas. It will be 10 miles in length.

**Duluth, Mississippi & Northern.**—An extension of 60 miles of this road directly to Duluth is proposed. At Duluth new ore docks will be built. Capitalists are now looking over the line, which can be easily built.

**Fredericksburg & Lancaster.**—The incorporators of the company have transferred their charter to a syndicate of New York and Connecticut capitalists. The new company, it is claimed, will commence the construction of the road immediately. The original incorporators are: Representative W. A. Jones, State Senator R. J. Washington, Hon. John E. Mason, L. T. Smith, Howard Hathaway, McD. Lee, State Senator W. A. Little and W. N. Ward, all of Virginia. The proposed road is to run from Fredericksburg, Va., to the Chesapeake Bay, through the so-called Northern Neck of Virginia.

**Itasca Lumber Co.**—An extension of 70 miles of this road, which now runs some 20 miles north from the northernmost point on the Mississippi River is proposed. The extension would take the road almost to the international boundary line on Rainy River.

**Medix Run.**—The charter of this company, granted at Harrisburg, Pa., on Feb. 7, provides for a road from Medix Run station on the Allegheny Valley Railroad in Elk County, Pa., passing through Elk County, about two miles, and continuing thence about six miles in Clearfield County to Orchard station in that county. Arthur M. Dodge, of New York, City, N. Y., is President, and the other directors are J. W. Hartman, Medix Run, Elk County, Pa.; Isaac S. Case, N. S. Brittain and Dr. George H. Rhoades, of Tobyhanna Mills, Monroe County, Pa.; L. A. Amsden and Adam Paxton, Medix Run, Pa.

**Metropolitan Elevated (Chicago).**—About 8½ miles of elevated structure are now constructed. Of this mileage nearly two miles to east of Paulina street has four tracks. The officers expect to begin operating the main line within about two months. This main line, to start up about April 1, extends from Franklin street to the east side of Forty-eighth street, the city's western limit. At present the downtown terminus is at Franklin street just south of Jackson street, but that is a temporary terminus. The terminal tracks there are arranged on the "stub" plan, like the railroad tracks at the World's Fair. The foundations are in for three miles more, forming part of the branch lines to the northwest. The iron work will be put up as fast as the company gets possession of the ground either by purchase or condemnation. These extensions will be called the Logan Square branch and the Humboldt Park branch. Running north from Madison street on Paulina, the two routes will continue to be one and the same as far out Milwaukee avenue as North avenue, from which point the Logan Square line will keep on its way out Milwaukee avenue, while the Humboldt Park line will run west on North avenue to a distance a mile west of that park.

**Nashville, Florence & Sheffield.**—Officers of the Commercial Club, of Tusculum, Ala., have recently visited Nashville and conferred with officers of the Louisville & Nashville Co., the lessee of the Nashville, Florence & Sheffield Road, to urge the building of an extension from Sheffield to Tusculum, a distance of two miles. Tusculum is on the main line of the Memphis & Charleston Railroad. The Birmingham, Sheffield & Tennessee River Road, from Sheffield to Jasper, leaves Tusculum about one mile to one side, and the Nashville, Florence & Sheffield stops at Sheffield. The extension of the Nashville, Florence & Sheffield would give the town a competing line.

**New Roads.**—The town of Napoleon, O., has been asked to contribute \$2,000 toward a road from Montpelier O., southeast to Deshler, O., about 45 miles.

**Northern Oklahoma.**—A charter has been issued in Oklahoma to this company, with headquarters at Blackwell, Oklahoma. The capital stock is \$100,000, and the officers are as follows: A. J. Blackwell, President; J. C. Miller, Vice President; John R. May, Secretary; F. W. Potts, Treasurer. The company proposes to build a road from the Kansas State line, beginning at Arkansas City or Hunnewell, to the city of Blackwell, Ok.

**Ohio Southern.**—The company is making arrangements to extend its line into Lima, O., northward through the city and connect with the Lake Erie & Western and Pennsylvania. At present the terminus is at the Chicago & Erie crossing. The company secured the right of way last spring.

**Ottawa & Gatineau Valley.**—This railroad is now in running order to Pickanock, Ont., a distance of 56 miles from Ottawa, and next summer it will be carried 25 miles further north to Desert, Que, the Indian name of which is Maniwaki. J. T. Prince, of Ottawa, is General Superintendent.

**Pennsylvania Midland.**—The construction work on this road from Cessna, Bedford county to Brooks Mills, Blair county, about 20 miles, will be pushed as soon as the weather will permit. It is expected that the main line will be opened for traffic by May. The company has already secured large contracts for the shipping of coal and timber. E. A. Tennis, of Thompsonstown, Pa., is the contractor, and J. Murray Africa, of Huntingdon, Pa., is Chief Engineer.

**Richmond, Petersburg & Carolina.**—The city council of Petersburg, Va., has adopted a resolution authorizing the finance committee to continue in negotiation for the construction of the above named railroad, (the old Virginia & Carolina,) on the same basis and terms as were offered by the city in its negotiations with R. B. Davis of New York, and his associates, and with the same or additional securities for the completion of the contract for building the road. An ordinance was presented, providing that bonds of the city of Petersburg be issued to the extent of \$194,500 bearing date of March 1, 1895, and payable in 40 years, and bearing interest at the rate of 5 per cent.

**Rio Grande & Pasoga Springs.**—This company has been incorporated in Colorado by J. J. McGinnith, Charles D. McPhee, Wm. L. Field, Wm. F. McPhee of Denver, and Edgar M. Briggs, of Catskill, Rio Arriba county, N. M. The capital stock is placed at \$100,000. The company proposes to build a road from Lumberton, N. M., on the Rio Grande River to Pasoga Springs, Col.

**San Antonio & Brownsville.**—The company has filed a charter with the Secretary of State at Austin, Tex. The incorporators are J. S. Doak, J. M. Puella, J. A. Hinman, J. A. Ball, W. O. Hogan, of San Antonio; E. Muelen, of Yoakum; J. M. Wallace, of Waco; R. E. L. Doak, of Fort Worth; J. W. Preston, of Pleasanton; J. S. Whitsett, of Campbellton, Tex. The capital stock is \$300,000.

**Ulster & Delaware.**—The stockholders have authorized the extension to Kingston Point, a mile up the Hudson from Rondout, N. Y. This will allow the Albany day boats on the Hudson River to land their Catskill Mountain passengers direct at the trains instead of at Rhinebeck, across the river. At Kingston Point a large dock



and terminal station will be built. The work will be begun in the spring.

**Union Pacific, Denver & Gulf.**—Work on the extension north from Trinidad, Col., has again been resumed the conference between Receiver Trumbull and the Denver & Rio Grande officials having so far failed to effect a revised trackage agreement. The construction is being done under the supervision of Chief Engineer Bissell by workmen in the employ of the company. The first gap to be filled is between Trinidad and Forbes Junction, a distance of eight miles; this will give the company an independent track to Acme Junction. A large force is at work upon the new shops at Trinidad.

**West Virginia Short Line.**—A charter was issued in West Virginia on Friday of last week to this company for a railroad from New Martinsville, W. Va., following the valley of Fishing Creek to its headwaters, thence down the valleys of Middle Run and Ten-Mile Creek to the headwaters of West Fork River, and following the valley of that stream to Clarksburg, W. Va. The capital authorized is \$1,000,000, and the paid-up subscriptions, \$5,000. The principal office is at Clarksburg, W. Va.

#### GENERAL RAILROAD NEWS.

**Atchison, Topeka & Santa Fe.**—Arguments were made before Judge Cuthwell at St. Louis on Feb. 6 on a petition of the Receivers for a hearing on a demand of the Wells, Fargo & Co. express for a modification of its existing contract with the Atchison on the ground that it was burdensome to them and that its requirements were not now justified by the volume of business. The Receivers questioned their authority to treat with the express company and asked for instructions. The Court held that they had authority and instructed them to investigate and make a recommendation to him.

**Atlanta & Florida.**—An order has been issued for the sale of the railroad on March 9, at Atlanta, by Judge Newman of the United States Court. The least amount which will be accepted as a bid for the property will be \$175,000.

**Bucouche & Moncton.**—The railroad was last month sold by auction under foreclosure of mortgage by the Central Trust Co., of New York. The amount of the mortgage was over \$407,000, but the road was sold to Capt. Israel J. Meritt of New York, for \$22,000. The road extends from Bucouche to Moncton, N. B., 32 miles. It is now operated as the Moncton & Bucouche Railroad.

**Central of Georgia.**—The receivers have been authorized by the court to buy 1,500 tons of 70-lb. rails for the main line and 5,000 tons of 63½-lb. rails for the Southwestern Railroad. The cost of the new rails will be about \$125,000.

**Chicago, Milwaukee & St. Paul.**—The company reports the following earnings for December and the half year.

|                        | 1894.        | 1893.        | Inc. or Dec.  |
|------------------------|--------------|--------------|---------------|
| Gross earnings.....    | \$2,203,523  | \$2,534,174  | D \$330,650   |
| Oper. expenses.....    | 1,302,275    | 1,674,733    | D 372,458     |
| Net earnings.....      | \$901,247    | \$859,440    | I \$41,807    |
| July 1 to December 31: |              |              |               |
| Gross earnings.....    | \$14,795,090 | \$17,649,655 | D \$2,854,565 |
| Oper. expenses.....    | 9,461,027    | 11,077,001   | D 1,615,973   |
| Net earnings.....      | \$5,334,062  | \$6,572,654  | D \$1,238,592 |

**Chicago & Northwestern.**—The company reports the following earnings for the year ending Dec. 31.

|                     | 1894.            | 1893.        | Inc. or Dec.   |
|---------------------|------------------|--------------|----------------|
| Gross earnings..... | \$20,119,362     | \$32,472,219 | D \$12,352,857 |
| Oper. expenses..... | 20,110,728       | 21,752,348   | D 1,641,620    |
| Net earnings.....   | \$9,008,634      | \$10,719,871 | D \$1,711,237  |
| Fixed charges.....  | 6,954,300        | 5,933,123    | I 1,021,177    |
| Balance.....        | \$2,054,334      | \$4,786,748  | D \$2,732,414  |
| Dividends.....      | 3,711,332        | 3,906,594    | D 195,262      |
| Deficit.....        | \$1,656,998 sur. | \$880,154    | I \$2,537,152  |

During the year 1894 the Milwaukee, Lake Shore & Western figures are included. In 1893, up to Aug. 31, the mileage operated was 4,273; after that the operations of the Milwaukee, Lake Shore & Western were included, raising the total to 5,031 miles.

**Duluth, Missabe & Northern.**—At the annual meeting of this road (the Rockefeller line), last week, it was shown that the road, which has had only one year's business, had cleared \$200,000 above all charges. There are \$2,200,000 of six per cent. first mortgage bonds, taken by J. D. Rockefeller at 80 cents, and \$1,900,000 of six per cent. seconds, taken by him in the height of the depression at 60 cents, the bonds thus averaging about nine per cent. There is outstanding \$2,600,000 of stock. The net earnings were applied to floating indebtedness, and as the road expects to haul 2,000,000 tons of ore at 80 cents a ton, during 1895, as against 1,300,000 tons the past season, it ought to earn 10 per cent. on its stock. Mr. Rockefeller took the bonds and stock during the panic of 1893, when the original proprietors were unable to carry the road. F. T. Gates, Mr. Rockefeller's private secretary, is President of the road; A. D. Allibone, First Vice-President and Treasurer; Alex. McDougall, Second Vice-President; S. R. Payne, Secretary; J. B. Cotton, Attorney; D. M. Philbin, Manager, and G. W. Murray, Counsel. All three, except the first and last, live in Duluth.

**Great Northern.**—The earnings for January and the six months are reported below.

|                                  | 1895.        | 1894.       | Inc.      |
|----------------------------------|--------------|-------------|-----------|
| Month of January.....            | \$689,910    | \$672,294   | \$17,616  |
| St. P. M. & M. leased lines..... | 86,169       | 63,865      | 22,304    |
| Eastern Ry. of Minn.....         | 105,857      | 109,966     | 4,891     |
| Montana Central Ry.....          |              |             |           |
| Total for system.....            | \$881,936    | \$837,125   | \$44,811  |
| July 1 to Jan. 31:               |              |             |           |
| St. P. M. & M. leased lines..... | \$8,869,468  | \$8,373,690 | \$495,778 |
| Eastern Ry. of Minn.....         | 995,500      | 924,452     | 71,048    |
| Montana Cen. Ry.....             | 282,500      | 645,618     | 282,882   |
| Total for system.....            | \$10,793,428 | \$9,953,760 | \$839,648 |

**Evansville & Terre Haute.**—The company agrees not to create any new bonds upon its property without the assent of the majority of the preferred stock that is to be issued in lieu of Evansville & Richmond bonds, unless it retires the preferred stock at par in cash, or gives its holders the privilege of exchanging it at par for such new bonds. More than three-fourths of the Evansville & Richmond bonds have been deposited with Harvey Fisk & Sons, under the agreement.

**Lower Laurentian.**—This railroad has been sold to the Quebec & Lake St. John Railway Co. This transaction is the outcome of an agreement between the parties interested in the Parry Sound Railroad, the directors of which are all more or less interested in the Lower Laurentian Railroad. The line will be known in future as the Lower Laurentian Division of the Quebec & Lake St. John. Certain alterations will be made on the line

about Riviere 91 Pierre and Allan's Mills, Que., so as to avoid the heavier grades. The road connects with the Quebec & Lake St. John road at Riviere a Pierre, Que., and extends thence to St. Tite Junction, Que., about 45 miles.

**New York, Lake Erie & Western.**—The earnings for the month of December are reported below:

|  | 1893.       | 1894.       | Dec.      |
|--|-------------|-------------|-----------|
| Gross earnings.....                              | \$2,187,266 | \$2,044,444 | \$142,822 |
| Working expenses.....                            | 1,592,188   | 1,543,770   | 48,418    |
| Less proportions due to leased lines.....        | \$55,078    | \$500,674   | \$94,404  |
| Net earnings.....                                | \$191,380   | \$183,247   | \$8,133   |
| Net earnings.....                                | \$403,697   | \$317,427   | \$86,270  |
| Results of operation of auxiliary companies..... | LOSS.       | LOSS.       |           |
| Net results of the system.....                   | \$382,793   | \$261,738   | \$121,055 |
| Oct. 1 to Dec. 31:                               |             |             |           |
| Gross earnings.....                              | \$7,305,757 | \$6,631,100 | \$674,650 |
| Working expenses.....                            | 4,939,532   | 4,642,618   | 296,913   |
| Less proportions due to leased lines.....        | \$2,366,225 | \$1,988,482 | \$377,743 |
| Net earnings.....                                | \$169,320   | \$136,758   | \$32,562  |
| Results of operation of auxiliary companies..... | PROFIT.     | LOSS.       |           |
| Net results of the system.....                   | \$1,735,159 | \$1,253,869 | \$481,290 |

Messrs. J. P. Morgan & Co., of New York, state that over three-quarters of the depositors of Erie securities have assented to the modifications proposed in their circular of Dec. 10 last.

**North Carolina.**—The directors of this road, which extends from Goldsboro, N. C., via Raleigh and Greensboro, to Charlotte, N. C., at their annual meeting, held at Greensboro on Feb. 7, declared a semi-annual dividend of 3 per cent., payable in March and September. The road is principally owned by the State of North Carolina, but is operated, under lease, as a part of the Southern Railway, that part of it running from Greensboro to Charlotte being a part of the main line.

**Norfolk & Western.**—Judge Goff, sitting in the United States Circuit Court at Richmond, on Feb. 6, placed the Norfolk & Western Railroad in the hands of receivers, and appointed R. J. Kimball and Henry Fink as receivers. The suit was instituted by the Fidelity Insurance Trust & Safe Deposit Co., of Philadelphia, and other creditors. The bill sets forth that the Philadelphia corporation above named are trustees under the mortgage deeds of trusts of the Norfolk & Western, as follows: The general mortgage, New River division first mortgage, improvement and extension mortgage, adjustment mortgage and Clinch Valley division mortgage. Under these mortgages bonds to the amount of \$18,500,000 have been issued. Aside from the value of the main line the railroad company is a large stockholder in the Old Dominion Steamship Co., the Roanoke Machine Works, the Pocahontas Coal Co., the Virginia Company, the Lynchburg & Durham Railroad and the Roanoke & Southern Railroad.

The following statement was given out at the general offices of the company: "This action was taken under the advice and at the recommendation of the holders and representatives of very large amounts of securities of the company, to whom the company had submitted a full statement of its financial condition and of the anticipated payments and receipts for the ensuing year. The property of the company is in excellent condition, but owing to the great depression in the coal and iron industries, and the unprecedentedly low rates prevailing, the net earnings of the company have for the past two years been insufficient to meet its fixed charges, and this has so seriously affected the credit of the company that it was thought impossible for it to continue its operations without some readjustment of its liabilities. A full statement of the affairs of the company will be issued in the course of a few days.

"The appointment of Mr. Kimball was requested by several Philadelphia trust companies and by the Board of Directors, and Mr. Henry Fink was selected in view of his successful administration as receiver of the old Atlantic, Mississippi & Ohio Railroad, which was the predecessor of the Norfolk & Western Railroad Company. In the interval Mr. Fink has also acted as receiver of the East Tennessee, Virginia & Georgia Railroad, and the Memphis & Charleston Railroad, and is thoroughly familiar with the property and the industrial interests of the section through which the road runs."

Chicago special.—Judge Taft, of the United States Court has refused to appoint President Kimball Receiver of Norfolk & Western for the property in Ohio; but Henry Fink has been appointed.

**Philadelphia & Erie.**—The annual report of the Board of Managers shows the earnings for the year ended Dec. 31 last to have been \$3,965,196 and the expenses \$2,942,612, leaving the net earnings \$1,022,583, a decrease of \$532,413 over the amount earned in the previous year.

**Pontiac & Pacific Junction.**—Mr. W. Dale Harris, chief engineer of the railroad, states that arrangements for the purchase by his company from the Canadian Pacific railway of the branch line from Hull to Aylmer have been completed.

**Southern.**—The statement of earnings and expenses of the Southern Railway Co. for the month of December, 1894, and for six months from July 1, 1894, compared with the same periods for the year 1893, shows:

|                               | 1894.          | 1893.          | Inc. or Dec.  |
|-------------------------------|----------------|----------------|---------------|
| Mileage.....                  | 4,404.7        | 4,404.7        |               |
| Gross earnings.....           | \$1,668,803 36 | \$1,641,473 92 | I \$27,329 44 |
| Expenses & Taxes.....         | 1,068,331 24   | 1,055,392 32   | I 12,938 92   |
| Net earnings.....             | \$600,472 12   | \$586,081 60   | I \$14,390 52 |
| Per cent. expen. to earn..... | 64             | 64.3           |               |

For six months, July 1 to December 31, 1894—

|                               | 1894.          | 1893.          | Inc. or Dec.   |
|-------------------------------|----------------|----------------|----------------|
| Gross earnings.....           | \$8,746,139 47 | \$8,215,212 73 | I \$530,926 74 |
| Expenses & Taxes.....         | 5,646,275 28   | 5,651,864 06   | D 5,588 78     |
| Net earnings.....             | \$3,099,864 19 | \$2,563,348 67 | I \$536,515 52 |
| Per cent. expen. to earn..... | 64.5           | 68.8           |                |

**Texas Western.**—The sale of the railroad, which was set for last week has been again postponed until the first Tuesday in May. The reason assigned for the postponement by Judge Bryant of the United States Court at Galveston was that the depressed financial conditions of the country would hardly admit of the road bringing a fair price.

**Wisconsin Central.**—The Reorganization Committee, George Coppel, Chairman, announces that a bondholders' agreement has been prepared which will become operative when a majority of the first mortgage bonds have been deposited. The committee invites holders of

the first mortgage five per cent. bonds and holders of income bonds to deposit their securities with the United States Trust Co. The committee has been engaged in an investigation of the company's affairs, which investigation it now proposes to supplement by examination of the company's books and finances through Mr. Stephen Little. Chairman Coppel states that a plan of reorganization, based upon earnings and business conditions, will be formulated as soon as the committee is in possession of the information necessary to the work.

#### TRAFFIC.

##### Traffic Notes.

The steamers between San Francisco and Puget Sound ports are cutting rates, and first cabin tickets are now sold for \$10 each, about half the regular rate.

The Northern Pacific recently took three carloads of halibut from Tacoma, Wash., for Boston.

The Secretary of Agriculture has issued regulations concerning cattle transportation to be in force from Feb. 15 to Dec. 1. The Texas fever-line, so-called, has been extended westward to the Pacific coast.

In the absence of other material for excitement the traffic men of Alabama, according to a Birmingham paper, have got up a little rate war over some emigrants going to Mexico. The Queen & Crescent is accused of having broken its agreement with competing lines. A Texas reporter, given to realism, saw a trainload of these emigrants passing through Houston and says that "it contained 200 negroes of all ages, sexes and conditions. These negroes are from Alabama, and are traveling to Mexico under the Ellis colonization scheme. Most of them were small, scrubby negroes, and many were badly clad and in bad shape generally."

##### Chicago Traffic Matters.

CHICAGO, Feb. 13, 1895.

There has been no change in the Western passenger situation. It is expected that the new trans-continental rates will go into effect Feb. 15, but the date when the new agreement will become effective remains uncertain owing to non agreement between the Union Pacific, the Burlington and the Rock Island regarding the Ogden and Denver gateways. The two latter roads profess to be willing to arbitrate the matter, and it seems probable that some compromise will yet be reached. It was at first proposed to go ahead without the Union Pacific, but the Missouri Pacific is unwilling to join until the Union Pacific comes in. The Rio Grande Western also has some grievances which it wants adjusted before it signs, but no serious trouble is looked for from this quarter.

The Great Northern and Northern Pacific have joined the Western immigrant clearing house. With the Canadian Pacific, Northern Pacific and Great Northern in, the satisfactory working of the clearing house would seem to be assured.

As was expected, the Chicago Freight Bureau and the roads have arrived at a compromise in the matter of the complaint to the Illinois board of railroad and warehouse commissioners that Chicago merchants were discriminated against in rates from Indiana, Ohio and Michigan to interior towns in Illinois. The roads have agreed to adopt the Official Classification in lieu of the Illinois and Western classifications on shipments from Chicago to points in Illinois, with some slight changes in a few commodity rates, and the complaint has been withdrawn.

The Missouri Pacific and the Chicago, Burlington & Quincy are complaining because under the agreement of the Western Trunk Line Committee they are being called upon to reduce their tonnage to their agreed percentages by diverting freight to other lines that are short. They claim that the percentages allotted them are too small and demand a readjustment on the ground that their tonnage movement shows that they are carrying more freight than they are supposed to be able to. The other lines retort by saying that the complaining companies were satisfied with their percentages when the award was made, and intimate that some, if not all, of the excess tonnage going over these roads is being secured by underhanded means for the purpose of furnishing an argument in support of their demands for an increased allowance.

The result of the St. Louis meeting to consider various complaints concerning violations of the Western pass agreement was the reaffirming of the agreement, and all is apparently harmonious again. The chief cause of complaint was the fact that one or two of the members had been very liberal in the issuance of passes to their bondsmen, many of whom were merchants and shippers, thus creating a suspicion that they were using the bondsman privilege to work an evasion of the general agreement. They, of course, claimed that they had acted strictly within the rules and no one seemed willing to take the initiative in breaking down the agreement.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Feb. 9, amounted to 61,532 tons, against 54,256 tons during the preceding week, an increase of 7,276 tons, and against 47,539 tons for the corresponding week last year. The proportions as carried by each road were:

| ROADS.                       | WEEK TO Feb. 9. |       | WEEK TO Feb. 2. |       |
|------------------------------|-----------------|-------|-----------------|-------|
|                              | Tons.           | p. c. | Tons.           | p. c. |
| Michigan Central.....        | 9,849           | 16.0  | 8,734           | 16.1  |
| Wabash.....                  | 3,665           | 6.0   | 4,590           | 8.4   |
| Lake Shore & Mich. South..   | 4,275           | 6.9   | 4,000           | 7.4   |
| Pitts., Ft. Wayne & Chicago. | 14,650          | 23.8  | 8,408           | 15.4  |
| Pitts., Cin. & St. Louis     | 8,376           | 13.6  | 8,107           | 14.9  |
| Baltimore & Ohio.....        | 7,531           | 12.2  | 7,327           | 13.5  |
| Chicago & Grand Trunk....    | 2,685           | 4.4   | 1,767           | 3.3   |
| New York, Chic. & St. Louis  | 4,995           | 8.1   | 5,755           | 10.6  |
| Chicago & Erie.....          | 4,340           | 7.1   | 4,006           | 7.4   |
| C., C. C. & St. Louis.....   | 1,166           | 1.9   | 1,562           | 3.0   |
| Totals.....                  | 61,532          | 100.0 | 54,256          | 100.0 |

Of the above shipments, 5,442 tons were flour, 23,759 tons grain and mill stuff, 15,287 tons cured meats, 8,986 tons dressed beef, 1,326 tons butter, 1,409 tons hides, and 4,271 tons lumber. The three Vanderbilt lines carried 31.0 per cent., the Pennsylvania line 37.4 per cent.

##### Underbilled \$281,061.

A Western paper prints figures showing the business of certain weighing and inspection bureaus for the year 1894, which we tabulate as follows:

|                   | GAIN.       |           |                   |                    |
|-------------------|-------------|-----------|-------------------|--------------------|
|                   | Cars, bulk. | Cars.     | Platform Freight. | In Classification. |
| Indianapolis..... | 36,897      | \$91,268  | \$15,810          | \$6,808            |
| Terre Haute.....  | 16,377      | 44,579    | 4,537             | 6,533              |
| Evansville.....   | 10,336      | 29,819    | 6,984             | 2,452              |
| Vincennes.....    | 2,617       | 3,554     | 1,428             | 4,982              |
| Louisville.....   | 28,799      | 47,298    | 13,727            | 6,263              |
| Total.....        | 95,026      | \$216,518 | \$42,485          | \$22,057           |